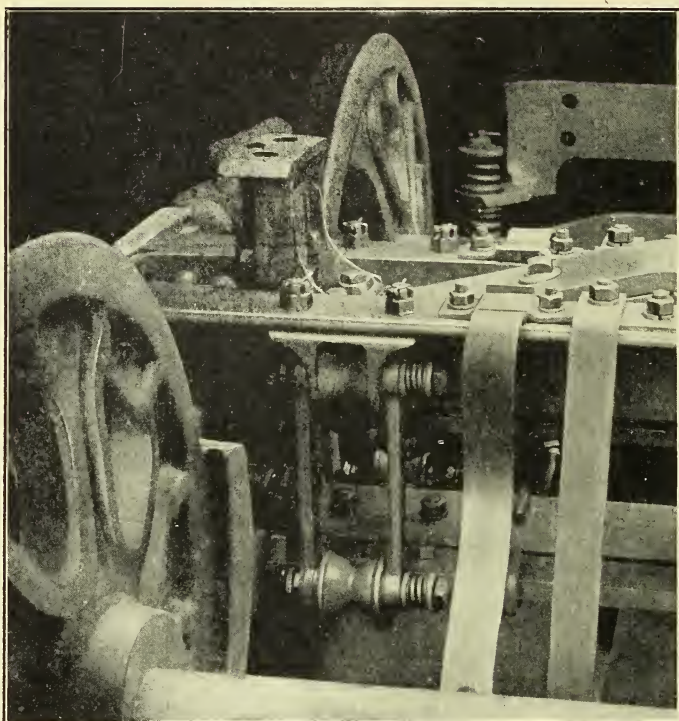


BRILL MAGAZINE



Granby Street
Norfolk, Va.

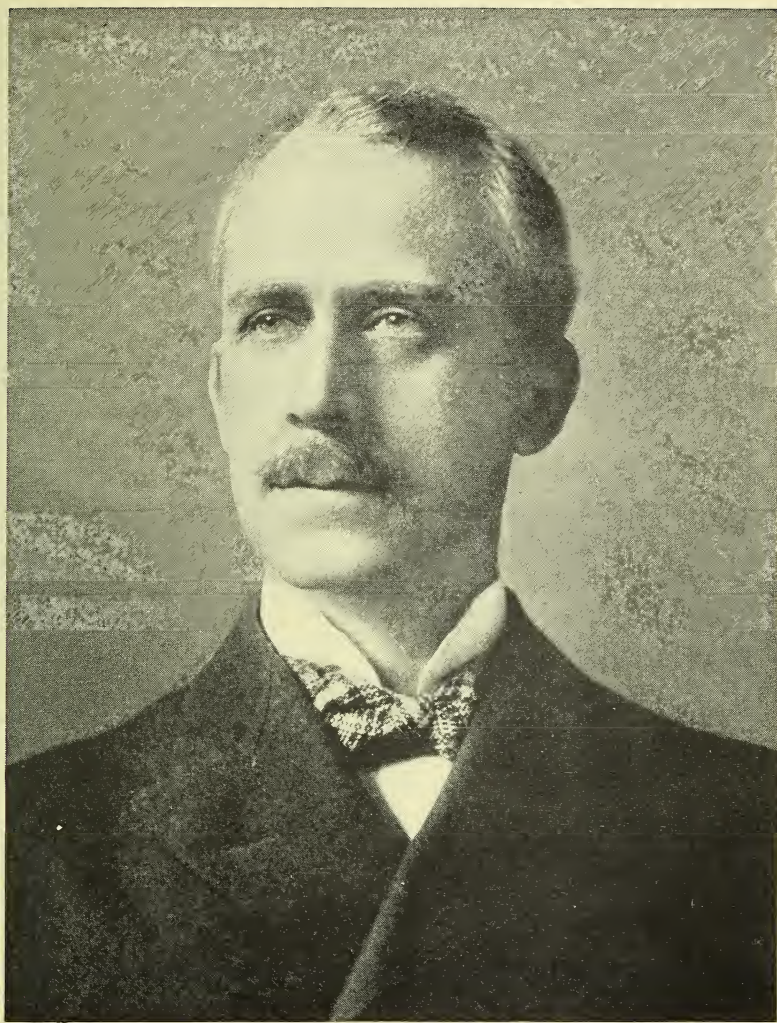


BRILL HALF-BALL BRAKE HANGER

(Patented)

The pair of hanger forgings are held firmly in hemispherical sockets by spiral springs on bolts which are in tension against the spring but which carry no other load. The hanger is noiseless, self-adjusting and self-cleaning. Send for full description.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



Geo. H. Harries.



BRILL MAGAZINE

Vol. IV

JANUARY, 1910

No. 1

GENERAL GEORGE H. HARRIES

GENERAL GEORGE H. HARRIES, second vice-president of the Washington Railway & Electric Company, was born in Wales, in 1860 and received his early education in the schools of that country. While still a boy he emigrated to the Canadian Northwest and he has spent many active years on the plains and in the mining regions. His familiarity with the traits of the Indians led President Harrison to appoint him in 1891 a member of the Sioux Commission. Before the outbreak of the war with Spain, General Harries was commissioned by President McKinley to the command of the brigade of the National Guard at the capital of the country and during the war he was given command of the regiment of infantry from the District of Columbia. General Harries' first connection of note with electric railways was as president of the Metropolitan Railroad Company, Washington, to which office he was elected in 1896. On his return from the Spanish war, he turned his attention to electric railway and lighting interests and in January 1900 became a member of the board of directors of the newly organized Washington Traction Company, a tentative aggregation of railway and electric lighting corporations. Six months later he became vice-president of the organization which is now known as the Washington Railway & Electric Company. General Harries is actively interested in electric railway and lighting organizations. He is a vice-president of the American Street & Interurban Railway Association and is chairman of the committee on Interstate Commerce Commission affairs of that association. He is a member of the executive committee of the National Electric Light Association and was for two years vice-president of the Association of Edison Illuminating Companies. He is a member of the American Institute of Electrical Engineers, the Illuminating Engineering Society, and of the Washington Society of Engineers. His Washington interests are both widespread and deep, the principal one, outside of his corporation work, being the Washington Board of Trade, of which he is now the president.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

NORFOLK

NORFOLK is essentially a city of shipping interests. The wonderful harbor facilities not only in her immediate possession, but all about her, are her source of life. And of late her shipping interests have grown considerably, not only as a natural result of these inherent conditions and the general expansion of the South, but also as a result of the diversion of a considerable tonnage from New York owing to the congestion at that port. The growing importance of Norfolk as a shipping center has been reflected in her growth in population. In 1900 the population of the city was 46,624. The coming census of 1910 will show a population in the city of from 75,000 to 80,000, all of which is served by the electric railway lines of the Norfolk & Portsmouth Traction Company and affiliated companies. In addition the company serves within a radius of six miles from the center of the city in Norfolk County and in Portsmouth and Berkeley a population of 70,000 to 75,000.

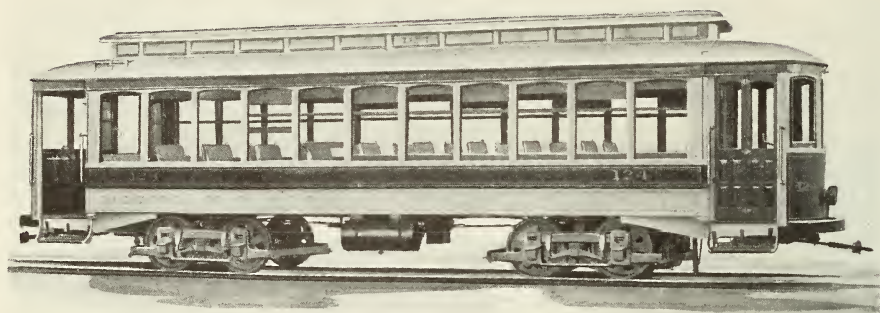
To serve a growing population of this sort, rolling stock to meet both city and suburban conditions has been necessary and the standard equipment of the traction company is a type generally referred to as "for city and suburban service." The traction company has constantly extended its lines into suburban territories and the boundaries of the city have been extended to include them. Districts of scattering population have in the course of a few years become as densely settled as some of the older portions of the city. The process has been repeated or other traction properties have been acquired in the outlying districts. Aside from this condition which has been a large factor in making necessary the use of a city and suburban type of car, there has been an influence, for a large portion of year, of the various seashore resorts. The electric railway lines to Ocean View, a distance of six miles from the center of the city, are largely used as means of transportation during the summer months, and beyond the city these and other lines to the shores of Chesapeake Bay operate under conditions which more nearly approximate those of interurban

service, at a speed of thirty-five and forty miles per hour, than suburban service where the speed limit is lower.

It has not been feasible to have one class of equipment for this service and another for the city service, because of a varying volume



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—There are 138 Miles of Track in the Electric Railway System of the Norfolk and Portsmouth Traction Company—
 The Lines in Portsmouth Have No Physical Connection With Those in Norfolk and Are Operated as a Separate Division



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Brill 30 ft. 8 in. Semi-Convertible Car on Brill No. 27-G Trucks Which Are the Standard of the Norfolk & Portsmouth Traction Company Are Used Throughout the Year

of traffic and because of the capital which would necessarily be tied up in idle equipment for a large portion of the year. And accordingly the net result of these conditions has been the adoption of the Brill semi-convertible car mounted on Brill No. 27-GE 1 Trucks as the standard of the company. One of the officials of the Norfolk & Portsmouth Traction Company has stated that "These cars fill the requirements for both summer and winter service better than any other." To provide for extra excursion business to the shore resorts, the company also has an equipment of Brill No. 14-bench open cars which are operated as trailers, and which give the passengers a choice between an open car and a car that "combines all the advantages of both an open and a closed car."



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Brill Standard Fourteen-Bench Open Cars Are Operated as Trailers in the Summer Months When There is Heavy Travel to the Seashore Resorts

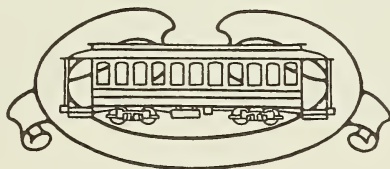
The standard Brill semi-convertible car used by the Norfolk & Portsmouth Traction Company has 18 transverse and 4 short longitudinal seats, and the following dimensions and features:

Length over corner posts	30 ft. 8 in.
Length over bumpers	41 ft. 9 in.
Width over sills including panels	7 ft. 11½ in.
Width over posts above window rail	8 ft. 2 in.
Seating capacity	44 persons.
Weight	
Car body	17,500 lb.
Trucks	11,700 "
Motors, electrical and air equipment	9,280 "
Total	38,480 lb.
Trucks	Brill 27-GE 1.
Motors	2GE 50 h. p.

The 14-bench open trail cars are mounted on the same type of trucks as the semi-convertible motor cars. Inasmuch as the trucks are not designed to carry motors, they are somewhat lighter than the trucks used under motor cars, as will be noted from the appended data covering the essential features of the open cars:

Length over crown pieces	37 ft. 10⅔ in.
Width over sills, including facings	7 ft. 0½ in.
Width over posts at seat ends	7 ft. 10 in.
Width over grab handles	8 ft. 4 in.
Seating capacity	70 persons
Weight	
Car body	13,750 lb.
Trucks	9,110 "
Total	22,860 lb.

In 1908, the Norfolk & Portsmouth Traction Company carried 18,223,746 revenue passengers, 729,029 free passengers and 1,520, 137 passengers on transfers, making the total 20,535,912 including the passengers carried in Portsmouth, which is a separate operating division. The miles of track owned or operated in 1908 was 138.19 and 269 cars were owned, practically all of which were built by The J. G. Brill Company.



EIGHTEEN-PASSENGER MOTOR OMNIBUSES

PAY-AS-YOU-ENTER TYPE

FIVE automobile omnibuses of the type shown in the accompanying engravings were recently shipped from the plant of The J. G. Brill Company to Baccich & deMontluzin, New Orleans, for the purpose of furnishing a suburb, now unserved by electric railway, with transportation facilities which it is hoped will aid in the development of the suburb and finally result in the extension of the electric railway lines. The busses will comfortably seat 18 passengers each and are of the Pay-As-You-Enter type and so arranged that one man serves both as driver or chauffeur and conductor. The bus bodies have the following dimensions:

Length over body	12 ft. 6 in.
Length over end panels at sills	16 ft. 0 in.
Extreme length	20 ft. 0 in.
Width of car over posts	6 ft. 0 in.
Width of car at sills	5 ft. 0 in.
Height from ground to top of roof	9 ft. 9 in.
Height from ground to floor of bus	29 in.

An examination of the above figures and of the engravings shows that the lines of the bus bodies are similar to those of the general type of city car with convex and concave panels below the window belt and with monitor roof. The bottom framing is substantial, though as light as consistent with strength, the side sills being oak $2\frac{3}{4}$ by 5 inches, the end sills $3\frac{3}{4}$ by $4\frac{1}{2}$ -inch oak and the crossings also of oak and $2\frac{7}{8}$ by $3\frac{3}{4}$ inches. The body framing is of similar proportions and the body has a weight complete of 2530 lbs.

The interior finish is cherry, including the linings, moldings and doors at the front end, which are of the double sliding type. The ceiling has a carline finish with roof boards showing. The seats and backs are spring tufted with hair and covered with Wilton carpet. The seats are arranged longitudinally along the sides of the car and there is also a seat against the two windows in the back of the car. The five windows on each side of the car have double sash, the top sash



EIGHTEEN-PASSENGER MOTOR OMNIBUSES—The Use of the Pay-As-You-Enter Feature with a Brill Fare Box Reduces Operating Expense and Insures Maximum Receipts

arranged stationary and the lower sash to drop. The two windows at the rear end of the car have the same arrangement. The side window on the driver's cab also has a two sash drop window at the side and front cab windows arranged for the left sash directly in front of the driver to slide to the right. There are six ventilator sashes on each



EIGHTEEN-PASSENGER MOTOR OMNIBUSES—The General Lines of the Bus Body Are Very Similar to Those of a City Electric Railway Car

side of the monitor deck. The trimmings throughout the car are solid bronze metal. Push buttons are installed at each side post and the cars are equipped with cherry hand poles and leather hand straps in the same



EIGHTEEN-PASSENGER MOTOR OMNIBUSES—The Wheel Tread is 66 Inches and the Extreme Width of the Bus Body 6 ft. 4½ in.

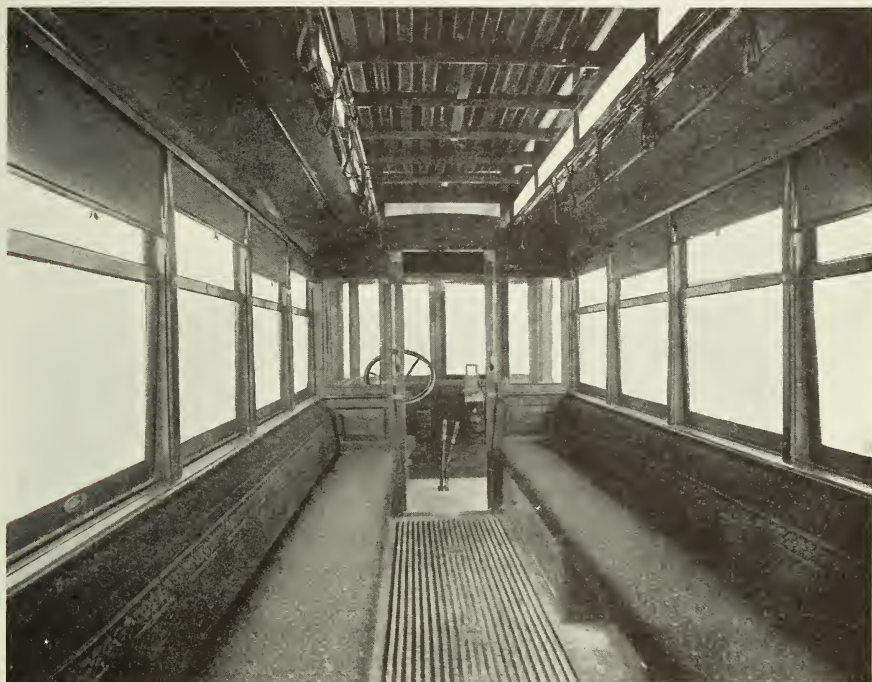
manner as in a trolley car. A Brill fare box of the No. 4 A type is installed on each car to facilitate the Pay - As - You - Enter method of fare collection. The position of this box is shown in the engravings. The box is made of aluminum with steel bottom and is adapted to the collection of both tickets and cash.

The chassis and motor equipment of each car is the product of the Gramm-Logan Motor Company of Bowling Green, Ohio. The frame is constructed from 5-inch rolled steel joined at the corners with steel castings. The sub-frame for the support of the motor is an integral part of the frame proper and is

constructed from 3 by 3 by $\frac{5}{16}$ -inch steel angles joined by steel castings and steel angle corner brackets. The front axle is forged from high carbon steel and yoked at the ends for the steering

knuckles. The rear axles are $3\frac{1}{4}$ -inch round machine steel. Timken roller bearings are used on both axles which carry pressed steel wheels. The front springs are semi-elliptics and the rear side springs are of the platform type.

The gasoline motor is water cooled, of the four-cylinder four-cycle type. The cylinders are $4\frac{3}{4}$ inches in diameter by 5 inches stroke and



EIGHTEEN-PASSENGER MOTOR OMNIBUSES—The Interior Finish is Cherry With Wilton Carpet Upholstery for the Seats—The Lower Window Sash is Arranged to Drop

the manufacturers claim that the motor develops 45 horsepower on an actual brake test. The carburetor is of the usual float feed type; the ignition is jump-spark from magneto or storage battery. Both spark and throttle levers are on the steering column. The change of speed lever and emergency brake lever are at the right of the driver's seat. The clutch and running brake are operated by foot pedals. The transmission is of the sliding gear type with three speeds forward and one reverse. The weight of each omnibus complete with chassis and ready for operation is 5610 lbs.

TWO TYPES OF COAL AND ASH CARS

SPECIAL PURPOSE EQUIPMENT

THERE is scarcely an electric railway so situated that it does not require a steam power plant. Large city lines frequently have a number of plants of this sort and such a road is fortunate indeed if its plants are so situated that coal can be delivered in the cars in which the coal is shipped from the mines. Even under these conditions, there are the cinders to be disposed of



TWO TYPES OF COAL AND ASH CARS—Steel Underframe Cinder Car of 37 Cubic Yards Capacity for the Philadelphia Rapid Transit Company

and their handling in course of time becomes a problem of considerable moment. But most roads are allowed to transport over their lines material for their own use regardless of restrictive ordinances covering the transportation of other freight of various sorts and this leaves a loophole for the economical disposal of ashes and other refuse.

As in the case of Philadelphia Rapid Transit Company, roads so situated will find it to their financial benefit to provide special cars for handling ashes. The cinder or ash cars of Philadelphia Rapid Transit Company, of which four have recently been completed and delivered by The J. G. Brill Company, are of steel underframe and semi-steel side construction and have a capacity of 37 cubic yards. The body of

each car is divided into two compartments by a center bulkhead and has a vestibule complete with swing side doors and drop end sash against each end bulkhead.

The underframing is built up from steel plates and shapes, the principal members, being the 10-in. 30-lb. steel channel side sills, the two 6-in. 13-lb. channel center sills, extending from end wall to end wall and the 9-in. 21-lb. I-beam cross ties three in number. The end sills are also 6-in. channels and have bolted to them 3½-in. oak crown-pieces. Steel channel diagonal braces, one each side of the transverse center of the car, are also employed. The bolsters are built of 9-in. steel channels with top and bottom tie plates.

The posts, of which there are three on each side including the corner posts, are 6-in. 8-lb. channels reinforced at the side sills by 18½-in. by 5-in. by ¼-in. steel plates. The floor, end walls and side doors are 1¾-in. yellow pine lap-jointed planks and plated with ⅛-in. steel plate on the hopper side. Each side of the car has two panels which are hinged to the posts. One door of each pair is provided with a heavy latch at the bottom which is operated from the cab. There is also a swinging beam at the top to hold the doors in place. A 8-in. by ¼-in. steel plate covers the joint between the doors and serves as well as to lock the door which is not held by the bottom latch.

The side doors of the end vestibules swing inward. The vestibules are covered on the outside below the end sash with No. 12 steel and are lined on the inside with poplar sheathing. Each vestibule hood has a steel angle rafter rigidly secured to the corner posts in order to support the trolley base stand. The principal dimensions of the cars are as follows:

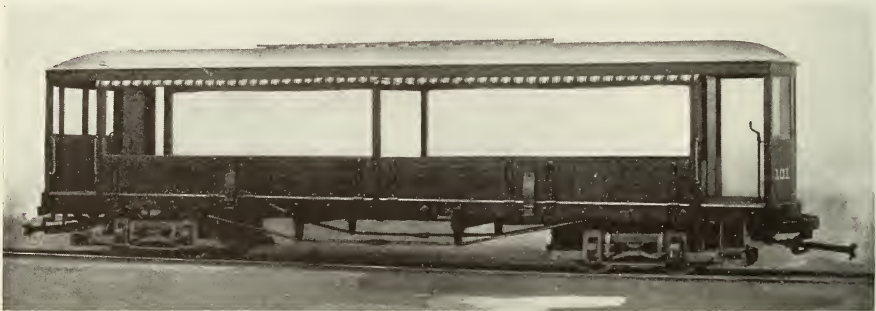
Length over bumpers	33 ft. 6 in.
Length inside hopper	24 ft. 8 in.
Width inside hopper	7 ft. 0 in.
Height from side sills to top of doors	6 ft. 9½ in.

The capacity of 37 cubic yards is secured when the car is level full. Another type car which can be used for carrying coal or ashes, but which has a wider range of service, has been delivered to the Philadelphia & Easton Electric Railway. This car is of the general service type and can be used as a standard flat car or by fitting it up with side stakes and side hinged doors as shown in the accompanying engraving,

the car becomes a standard gondola car. It is of all wood construction, except the bolsters, which are the built up plate type, and has the following dimensions:

Length over crown pieces	40 ft. 10 in.
Length inside end planks	32 ft. 0 in.
Width over side sills	7 ft. 8½ in.
Width inside side planks	7 ft. 4½ in.
Height of side doors	2 ft. 0 in.

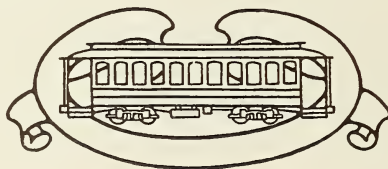
The car has two drop bottom hopper doors on each side, which give an opening nearly the width of the space between the center and



TWO TYPES OF COAL AND ASH CARS—Combination Flat and Gondola Car With Hopper Bottom Doors for the Philadelphia & Easton Electric Railway

the side sills. These doors are hinged at the ends and are operated by chains which pass through eye-bolts and are wound up by a substantial winding shaft. When the car is used as a hopper car, the false floor above the hopper doors is removed and supported under the car in a slide which is provided with a locking pin.

The roof extending from cab to cab is of the plain arched type and is provided with a trolley board in the center. It is made of tongue and grooved boards well painted, but not covered with canvas. The striped duck curtains at the sides and ends of the car body are fitted at the bottom with wood bars and arranged to roll up and be held in place with leather straps.



PASSENGER CARS FOR THE AMERICAN RAILROAD OF PORTO RICO

STEEL UNDERFRAME EQUIPMENT

THE American Railroad of Porto Rico is the only railroad of any extent on the island. It is 200 miles long, single track, metre gauge, and for the most part skirts the coast. Extending from San Juan to Ponce by a rather circuitous route, it is not the principal thoroughfare for freight of all kinds, but by an auxiliary system of plantation railways it also serves an interior district of considerable extent. The principal traffic is in the sugar cane and



CARS FOR THE AMERICAN RAILROAD OF PORTO RICO—The Line for Almost Its Entire Length Abounds in Scenic Attractions

fruits from the plantations which for the most part are delivered to San Juan for export.

The company, in addition to the freight service, operates two passenger trains each day—one in the morning and one in the evening. Recently Mr. J. Merier has been appointed manager of the railroad



CARS FOR THE AMERICAN RAILROAD OF PORTO RICO—The Road Extends from San Juan to Ponce, 200 Miles and for Much of the Distance the Ocean is in View

and under his direction more attention is being paid to the comfort of passengers with a view to developing not only the regular passenger traffic, but also the tourist business, which at certain seasons of the year is of material volume. The scenic features of the road are of a character to encourage sight seeing. For a considerable portion of the entire distance from San Juan to Ponce, the ocean is within view and at other times there is mountain scenery and the luxuriant vegetation of the semi-tropics.

The J. G. Brill Company recently completed and delivered to the



CARS FOR THE AMERICAN RAILROAD OF PORTO RICO—In Spite of the Scenic Attractions There Has Been Until Recently Comparatively Little Passenger Travel and Only Two Passenger Trains Per Day Have Been Operated

American Railroad Company of Porto Rico through Lebedjeff & Company of 143 Liberty Street, New York, export agents, three 35-foot first-class passenger cars mounted on Brill trucks. The cars are 40 ft. 4 in. long over platforms and 8 ft. 6 in. wide over sheathing. The underframing is built up from 8-inch structural steel, the side and end sills being channels and the center sills I-beams. Aside from the



CARS FOR THE AMERICAN RAILROAD OF PORTO RICO—The Three Cars Recently Delivered by The J. G. Brill Company Have Oak Interior Finish

steel underframing, which is essential for the damp climate of Porto Rico, there are no material differences from standard steam railway equipment of similar length which is used in the United States. The body framing in every respect conforms to "standard" practice and the usual straight sides and monitor roof are employed, extending over the platforms in steam coach style. The interior finish is oak and the ceiling is decorated oak veneer. There are 13 rattan covered seats on one side of each car and 12 on the other, the space of one seat being utilized for a saloon. The seats have oak arm rests on the aisle ends

and are of the Brill reversible pattern. The seating capacity of each car is 50 persons. There are three double burner center lamps in each car and nickle-plated basket racks are provided. Sliding blinds are used in place of curtains.

As a requirement for transportation to Porto Rico, the cars were erected complete as if for service and then taken apart in sections and packed in suitable strong boxes for ocean shipment, a practice The J. G. Brill Company has reduced to certain standards which insure delivery in fine condition under all circumstances. On occasions, as in



CARS FOR THE AMERICAN RAILROAD OF PORTO RICO—Steel Underframing and Mahogany Side Sheathing Are Used Largely Because of Climatic Conditions—The Cars are Mounted on Brill Trucks

this instance, an expert erector accompanied the shipment to destination and superintended the work of re-erecting the cars for actual service.

The engraving accompanying this article, which shows the exterior of one of the cars, gives the impression that the photograph of the car was taken while it was yet in the rough. Such is not the case, however; the appearance being entirely due to the fact that the side sheathing of the cars is mahogany which was varnished instead of painted. The rich color of the wood with the lettering in gold leaf gave the cars a very handsome exterior appearance. The cars were equipped with couplers of the M. C. B. type and since arrival at destination have been equipped with air brakes.



DOUBLE-DECK CARS FOR NATAL, SOUTH AFRICA

AN EXAMPLE OF LOW WEIGHT PER PASSENGER

IN a previous article (June, 1909) dealing with double-deck equipment there was pointed out the characteristic advantage of the type, of large seating capacity with relatively low dead weight per passenger. Without again entering into a discussion of the manifest reasons why the double-deck car is out of the question for the United States, in spite of its advantages with respect to economy of operation, a consideration of the following figures for the cars shown in the accompanying engraving will doubtless be of interest to students of car weights. The cars have the following dimensions:



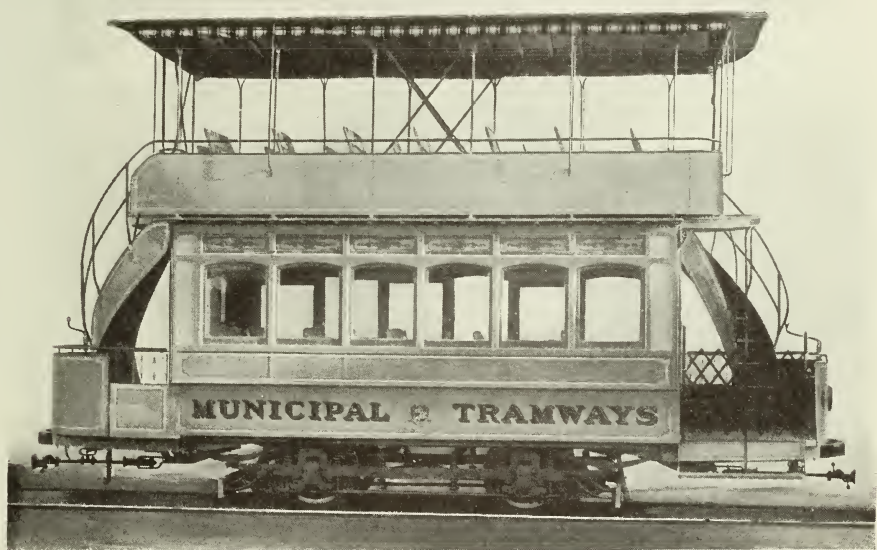
DOUBLE DECK CARS FOR DURBAN--The Interior Finish is Oak with Carline Ceiling Finish of Alternate Poplar and Bass Boards

Length over body corner posts . 16 ft. 6 in.	Height between upper deck
Length over platforms 26 " 6 "	and canopy 6 ft. 4 in.
Width over sills 7 " 4 "	Length of seats, lower deck . . . 32½ in.
Extreme width over guard rails . 8 " 2 "	Length of seats, upper deck . . . 34 " "
Extreme width over roof boards . 8 " 10 "	Seating capacity, lower deck . . 20 persons.
Height between upper and	Seating capacity, upper deck . 30 persons.
lower decks 6 " 7 "	—
	Total seating capacity 50 persons.

The division of the weight is as follows:

Weight of car body	11345 lbs.
Weight of Brill No. 21-E truck	5400 "
Weight of Motors (G. E. 58-A, 37 h. p.)	5240 "
	<hr/> Total, 21,985 lbs.

With the seating capacity of 50 persons the weight per seated passenger is 440 lbs., whereas the lowest weight per seated passenger given in the series of articles in Brill's Magazine on city cars of the United States is 680 lb. in the case of the standard car for Denver. The Denver cars have two 65 h. p. motors. Conditions of grade,

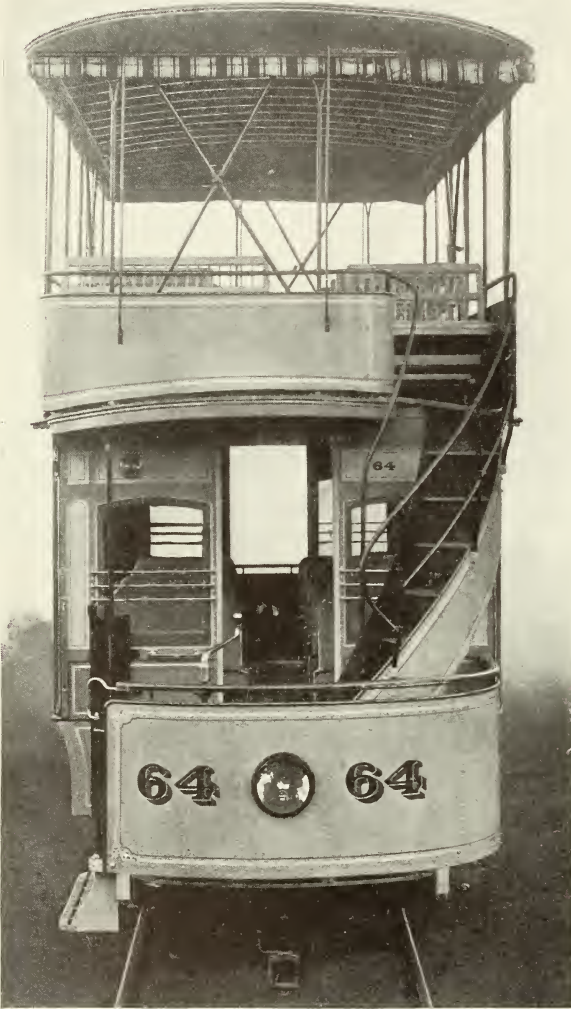


DOUBLE-DECK CARS FOR DURBAN—With A Length Over Corner Posts of 16 ft. 6 in. the Car Has a Seating Capacity of 60 Persons—Mounted on Brill No. 21-E Truck

operating speed, etc. have to be taken into consideration, but the relative first cost of the electrical equipment and the relative current consumption is quite obvious.

The Durban cars are in essential particulars duplicates of a previous lot built by The J. G. Brill Company in 1901. The framing, including sills and all up-rights, is of teak and the side sills, which are 4 by 7 in., are plated with 6 by $\frac{1}{4}$ -in. plates. The underframing is also supported at the ends by inside truss rods.

The interior finish of the cars is oak with a carline finish ceiling of alternate poplar and bass boards. The interior seats are upholstered in rattan; those on the upper deck have hardwood seats and backs. The window sash on the sides and at the ends of the cars are stationary except for two two center sash on



DOUBLE-DECK CARS FOR DURBAN—The Spiral Stair is Built of Light Sheet Steel and Has Safety Tread Inserts in the Wooden Steps

each side of the car, which are arranged to drop. Above the side windows, ventilator sash are placed which are fitted with ventilator

openers, except the pair over the two drop windows. The interior metal trimmings are of polished bronze. Spring roller curtains are furnished at each side window.

The sheet steel stairway for mounting to the top deck has wood tread with Mason safety tread inserts. The canopy roof is of light but substantial construction, with iron-pipe uprights well braced and canvas drop curtains on the sides and ends. The rail around the top deck and the stairways is iron pipe securely braced. Along each side of the top deck and extending around the ends there is a sheet metal panel which replaces the iron screens sometimes used and has been found to be more satisfactory in a number of ways. The cars are equipped with ten 16-candlepower lamps, two electrical signal bells and push buttons on both upper and lower decks.



EQUIPMENT FOR THE BRITISH COLUMBIA ELECTRIC RAIL- WAY COMPANY

PAY-AS-YOU-ENTER AND INTERURBAN TYPES

THE British Columbia Electric Railway Company operates a system of electric railways covering the territory in and around the cities of Vancouver and New Westminster. It also operates as a separate division the electric railway system in the city of Victoria, which is located on the Island of Vancouver. The city of Vancouver has a population of approximately 80,000 which is rapidly growing, and the population of New Westminster and lesser towns in the neighborhood, excluding Victoria, brings the total of city population in the vicinity to 100,000 or more.

With the city lines as a basis, the company is building an entirely modern interurban railway over sixty miles long reaching from the city of New Westminster westward between the Frazer River and the International Boundary to the town of Chilliwack. The road is designed for high speed operation, and passengers, express, baggage and freight will be transported. The overhead trolley system at 600 volts



EQUIPMENT FOR THE BRITISH COLUMBIA ELECTRIC RAILWAY—Passenger, Smoking and Baggage Car and Passenger and Smoking Car on Brill No. 27-E2 Trucks

will be used. Along the right of way is a succession of partially developed farms and large tracts of virgin forests. For miles the clearing appears as a street between high buildings. Pine, fir, cedar, spruce, hemlock and alder are the principal woods. In the open ground and where persistent farmers have made a clearing the rich, black soil shows



EQUIPMENT FOR THE BRITISH COLUMBIA ELECTRIC RAILWAY—Seats With Stationary Backs Are Used in the Smoking Compartment and Brill Winner Reversible Seats in the Passenger Compartment

that the wealth in the forest timber is only the beginning. The present scattered population might appear insufficient to justify the construction of the road, provided passenger traffic were the only consideration; but the forest timber thus made accessible to the terminal point should produce a remunerative freight traffic and long before this source of business is exhausted the fertile soil will undoubtedly attract a large population.

The British Columbia Electric Railway Company and its subsidiary corporations aside from operating electric railways is engaged in a



EQUIPMENT FOR THE BRITISH COLUMBIA ELECTRIC RAILWAY—The Baggage and Express Cars Have Diagonally Opposite End Doors and Two Sliding Doors With Five-foot Openings on Each Side

general electric light and power business covering the territory occupied by its railway systems, and for this purpose a set of three phase power mains extending between sub-stations and delivering current 2300 volts will be installed. The power used by the company for all purposes on the mainland is obtained from a hydro-electric plant located on the



EQUIPMENT FOR THE BRITISH COLUMBIA ELECTRIC RAILWAY—Interior of One of the Fifty-three Foot Baggage and Express Cars Built by the American Car Company

north arm of Burrard Inlet 18 miles by transmission lines from the center of Vancouver. The power is transmitted from this source to various sub-stations, through four transmission lines, at present delivering line voltage of 20,000 volts, with transformers in delta. As this voltage would be uneconomical for use with the lines required in connection with the extensions and as the voltage loss in transmission to the city of Vancouver has become considerable, the old lines will be reinsulated and the delivered voltage will be increased to 34,600 by connecting the transformers in Y.



EQUIPMENT FOR THE BRITISH COLUMBIA ELECTRIC RAILWAY—One of Five New City Cars Built by the John Stephenson Company and Mounted on Brill No. 27-G Trucks

Power for the road will be supplied from a sub-station at each end of the line, i. e., at New Westminster and Chilliwack, and also from four others located at intermediate points, so that the distance between sub-stations will average about twelve miles. Aside from these stationary sub-stations, there will be a portable sub-station with equipment similar to that of the railway part of each stationary sub-station, except that the apparatus will be of the air-cooled insulated type—a three phase transformer being used instead of single phase transformers.

The passenger and express car electric equipments ordered are of the four-motor type, each motor having a capacity of 75 horse power and the cars equipped with multiple unit control. Three 50-ton electric locomotives, each equipped with four 160-horse power motors, are being constructed in England for handling freight trains of ample length at excellent speed over the predominating easy curves of the road and the short maximum grade of 2.7 per cent.

The passenger equipment thus far ordered for the interurban extension includes a 43-ft. 4 in. passenger, smoking and baggage car, a passenger and smoking car of similar dimensions, and two 53 ft. 8 in.



EQUIPMENT FOR THE BRITISH COLUMBIA ELECTRIC RAILWAY—
The Pay-As-You-Enter Features Are Standard But the
Arrangement is for Left Hand Operation

baggage and express cars, all of which were built by the American Car Company and have been delivered. The over all length of the cars and the dimensions and type of framing is the same. The side sills are southern long-leaf yellow pine 4 by 8 $\frac{3}{4}$ in. with 2 by 6 in. sub-sill and a 15 by $\frac{3}{8}$ in. steel plate running the full length of the body securely bolted between. Intermediate sills and center sills are each 6 in. I-beams filled on each side with suitable yellow pine filling pieces. The end sills are of white oak 6 by 8 in. reinforced

on the underside with heavy steel angles, extending the full width of the body frame. Truss rods 1 $\frac{1}{2}$ in. diameter are placed under each side sill.

The general dimensions of the combination passenger, smoking and baggage car are as follows:

Length over end panels	43 ft. 4 in.
Length over vestibules	53 ft. 8 in.
Length over all	55 ft. 0 in.
Width over side sheathing	8 ft. 7 in.



EQUIPMENT FOR THE BRITISH COLUMBIA ELECTRIC RAILWAY—The City Cars Are Brill Semi-Convertible Cars With Pay-As-You-Enter Platforms

Height from track to top of trolley board	13 ft. 4 in.
Length of passenger compartment	22 ft. 1 in.
Length of baggage compartment	7 ft. 5 in.
Length of smoking compartment	13 ft. 10 in.

The above dimensions also apply to the passenger and smoking car, with the exception that the car body is divided into two compartments, the passenger compartment being 29 ft. 6 in. long and the smoking compartment 13 ft 10 in. The over all dimensions given above also apply to the baggage cars.

The interior finish of the passenger and smoking compartments of the two cars is solid mahogany throughout. Brill rattan covered Winner seats with reversible backs are used in the passenger compartments, except against the saloon and end partitions where stationary seats are employed. Stationary transverse seats are used in the smoking compartment and all the seats have mahogany arms rests on the aisle end. The interior arrangement of the cars is somewhat unusual in

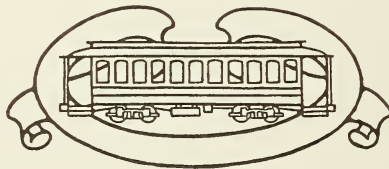
that there is a saloon in both the passenger and the smoking compartments.

The baggage cars have the usual interior baggage car finish with yellow pine inside sheathing and carline roof finish. Motormen's compartments are placed at diagonal corners of the cars and separated from the baggage portion of the car by a partition. The double sliding doors, of which there are two on each side, are 5 ft. wide. There are narrow motormen's swinging doors for outside entrance to both motormen's compartments and diagonally opposite swinging end doors to allow for the loading of long material.

In addition to the cars built by the American Car Company for the interurban lines of the British Columbia Electric Railway Company, the John Stephenson Company has recently completed and delivered five Brill patented semi-convertible cars with Pay-As-You-Enter platforms for operation on the city lines. The arrangement of the Pay-As-You-Enter features is standard in every respect except that they are built for "left-hand" operation to conform to the English practice. The cars have the following dimensions and are mounted on Brill No. 27-G1 trucks:

Length over end panels	28 ft.
Length over crown pieces	40 ft.
Width over posts above window belt	8 ft. 5 in.
Height from rail over trolley boards	11 ft. 4- $\frac{3}{8}$ in.
Seating capacity	40 persons

The cars are full-vestibuled and arranged for double-end operation. The vestibule doors on the controller side of the car are arranged in two sections to fold against controller.



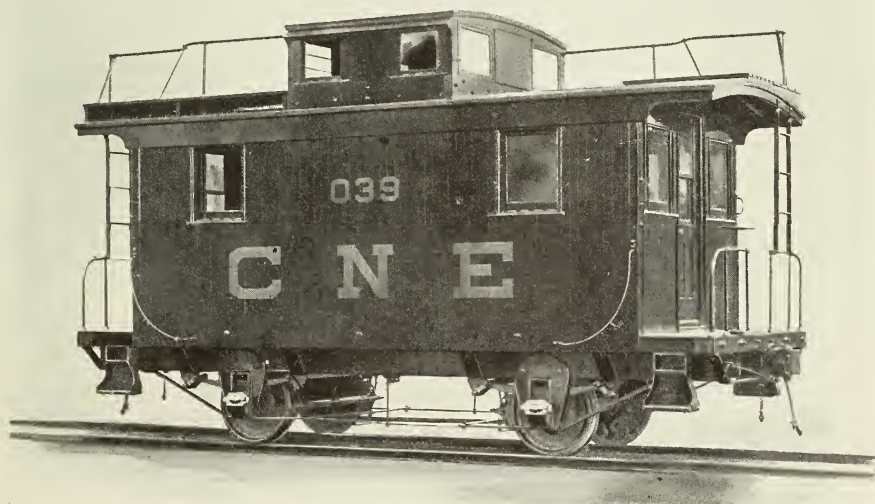
TWO TYPES OF CABOOSE CARS

STEAM RAILWAY EQUIPMENT

TWO types of caboose cars have recently been delivered from plants of the Brill companies. The Wason Manufacturing Company was the builder of six 4-wheel cabooses for the Central New England Railway, and the Danville Car Company of four 8-wheel cars of the same general type for the Denver Northwestern & Pacific Railway. The cabooses built by the Wason Manufacturing Company have the following principal dimensions:

Length over corner posts	18 ft. 3½ in.
Length over platforms	23 ft. 0 in.
Width over sills	4 ft. 7¾ in.
Width over side sheathing	9 ft. 1 in.
Height from under side of sills over tower	10 ft. 8½ in.
Height from floor to ceiling	7 ft. 3 in.

The cars are examples of the standard caboose equipment of the Central New England Railway and are finished inside with North Carolina pine and Douglas fir.



TWO TYPES OF CABOOSE CARS—Twenty-three Foot Caboose Car Built by the Wason Manufacturing Company for the Central New England Railway

The cars built by the Danville Car Company for the Denver Northwestern & Pacific are considerably larger than the Central New England cabooses. They have the following principal dimensions:

Length inside	28 ft. 4½ in.
Length over platforms	33 ft. 2 in.
Width over side sills	9 ft. 1 in.
Width inside	8 ft. 5¼ in.

The cupola or tower platform is 5 ft. 1 in. long by 4 ft. 10 in. high. There are lockers under the platform on the ladder side which are well



TWO TYPES OF CABOOSE CARS—Double Truck Caboose Car Built by the Danville Car Company

equipped with shelves and other conveniences. Each car also has a water tank, a porcelain lined washstand and a stationary desk and there is space for a stove. The seats in the main room of the car have lockers under them and are furnished with cushions and backs 3 inches thick filled with hair and tow. The windows are supplied with printed duck curtains hung on spring rollers. Unfortunately the variety and extent of the interior features of the car which are considered necessary or are for the comfort and convenience of the trainmen, and their arrangement in the car, has made it impossible to obtain a photograph which would convey the proper impression.

EVERY city electric railway has certain moral obligations towards the population which it serves in the matter of the development of outlying districts and aside from those considerations must undertake for its own welfare more or less work in the nature of extensions. Yet extensions most invariably result in absolute loss for several years before the population becomes sufficiently dense to pay operating expenses and it is the knowledge of that fact which quite frequently leads a board of directors to refuse to authorize an extension. A case somewhat of this sort arose in connection with the order for the automobile omnibusses which are described on another page. A real estate company invested in some outlying land which it laid out in city lots and expected to dispose of it to advantage by modern promotion methods, the project being based largely on the prospect of being able to induce the electric railway company to extend its lines in order to furnish transportation facilities to the suburb. But the electric railway company refused. Being a live concern, the real estate company set about to provide its own transportation and after a consideration of all the conditions, including those of the probability that the traction company would ultimately extend when the population of suburb developed, decided to operate an automobile bus line. The circumstance suggests that electric railways might use similar equipment in opening up outlying

districts before investing in overhead wire and track, which entail a series of fixed charges. The cost of a bus is slightly less than the cost of a car and it can cover a wider field and can change its route if circumstances show that development is taking a different course from the one originally expected. If the suburb fails to develop, the equipment still has a tangible value and can be utilized elsewhere; whereas if the population increases sufficiently to warrant the construction of an electric railway the busses lose none of their value thereby, being available for the development of some other suburb.



STRICTLY speaking a city and suburban type of car is more generally used in the cities of the United States than the car for exclusively city service. To that extent the articles are incorrectly named which are appearing in the Brill Magazine under the title "Conditions which Govern the Type of Car for City Service." With the idea in mind that where the requirements of electric railway service are exclusively those of a city, cars must constantly contend with street traffic of all kinds for the entire length of their route, and must come to a stop at practically every street intersection to handle passengers, it is interesting to review the conditions in the cities of the United States under discussion during the past year. It will be noted by a review of

this sort that there is only one city in the list, New York, where true city conditions are found. On this basis the standard New York car is the only car which is strictly a city type. Even in Chicago and Philadelphia the majority of the electric railway lines serve not only the city but an extensive outlying suburban or semi-city district.

But these cities are rapidly approaching a metropolitan condition which is comparable to that of New York, and it is reasonable to assume that in the course of time the equipment in Chicago, New York and Philadelphia and other large cities, will be more nearly the same. Already the equipment of the three cities mentioned is similar in that the prepayment type of car is used. It is in the trucks and electric equipment, however, that the cars of Philadelphia and Chicago differ basically from the cars of New York. Though the trucks in use in Philadelphia are different from those used in Chicago, fundamentally they are similar. Both types are designed for operation at speeds up to 35 miles per hour and have a motor equipment of two motors per truck which contemplates in its design not only the frequent starts and stops and operation at a comparatively low speed within the center of the city, but also more or less prolonged operation at high speed in the city's outskirts. The standard New York truck on the other hand is a single-motor type which contemplates a rapid succession of operations from stop to maximum

speed and reverse. This equipment has shown ability to maintain speed.

One of the first considerations in the choice of car and truck equipment for New York was that of weight, not only of the trucks and motors themselves, but of the load which they were to carry. This consideration was closely allied with the important one of power consumption. Another feature of importance, because of the effect upon the time required at stops to handle passengers and upon possible accidents, was that of step heights. Acceleration, derailments and wheel slippage were also carefully considered. Not the least important consideration was the relation the various features would have to track and shop maintenance charges. But with all these considerations constantly in view the single-motor truck equipment was the choice of the management of the two New York surface railways and of their staffs of electric railway engineers. Is it not reasonable, accordingly, to assume that the single-motor truck equipment for strictly city conditions is the most logical type? While admitting that in many cities the suburban element must be taken into consideration in the design of the car, nevertheless it appears as though many managers were allowing that consideration to outweigh the consideration of the strictly city elements, which, in proportion to the mileage of track in the so-called city class and in the suburban class, should have the greater weight.

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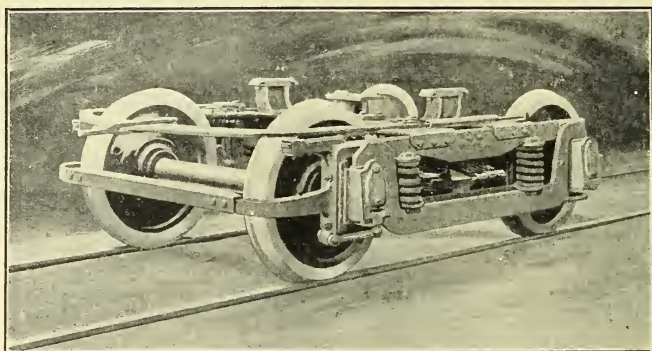
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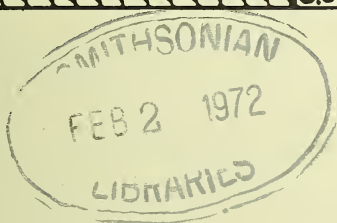


THE BRILL No. 27 M. C. B. TRUCK

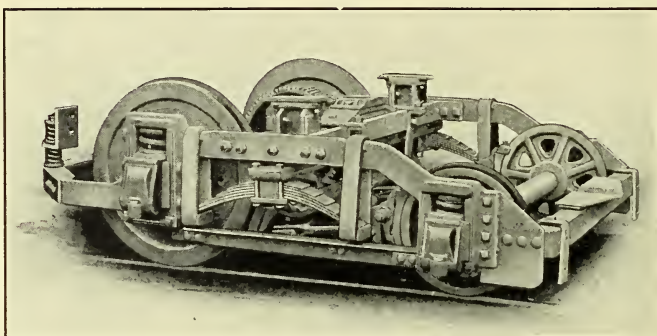
¶ Side frames, including yokes, solid forged in a single piece. ¶ Wrought plate brackets and wrought gusset plates folded over side frames, tie the side frames and channel transoms together with minimum number of bolts in shear. ¶ Bolster made of cast steel. ¶ Direct brake application through a one-piece radial lever. ¶ Special tie bar construction which reinforces pedestals and eliminates shearing strains on bolts. ¶ Transom and bolster chafing plates renewable without removing the bolster.

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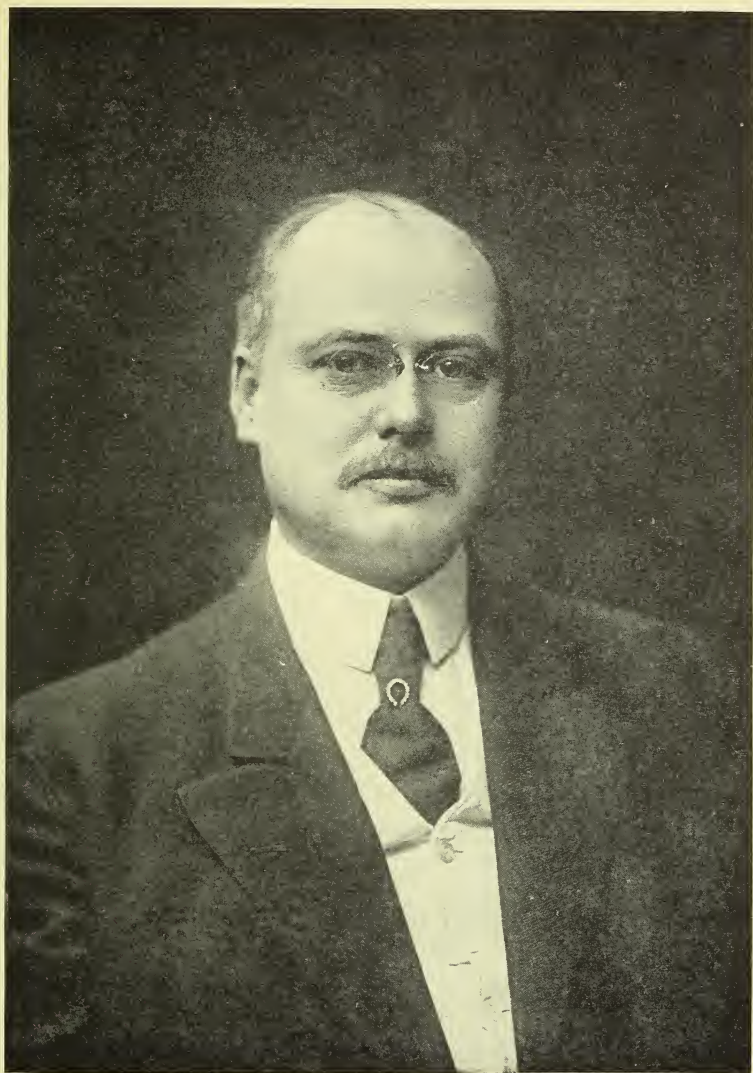
Praça dos Restauradores
Libson, Portugal



BRILL No. 39-E SINGLE MOTOR TRUCK

The No. 39-E truck has been adopted as standard for the two large surface transportation systems of New York City. The choice of the truck from among many was made by a staff of expert traction engineers after a careful consideration of first and operating cost and maintenance charges and the features on which they are dependent, such as weight, power consumption, acceleration, step heights, wheel slippage. The judgment of these engineers confirms our own opinion that the No. 39-E truck for the majority of city electric railways is the most logical and economical truck on the market to-day.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



Chas. H. H. H.



BRILL MAGAZINE

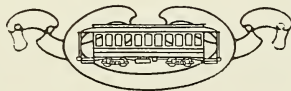
Vol. IV

FEBRUARY, 1910

No. 2

CHARLES O. KRUGER

CHARLES O. KRUGER, president and general manager of the Philadelphia Rapid Transit Company, was born in Germantown, a suburb of Philadelphia, on December 14th, 1864. He received his education in the public schools of Philadelphia and was graduated from the Germantown Grammar School in 1882. His first business connection was with the Philadelphia banking house of S. & W. Welsh, where his ability gained him rapid promotion to positions of responsibility connected with enterprises in which the firm was interested. Ten years after his first connection with S. & W. Welsh, Mr. Kruger was elected secretary and treasurer of the Penn Traffic Company and a year later assumed the same offices with the Peoples Traction Company. Three years later in 1895 when the Union Traction Company was formed, Mr. Kruger was elected secretary and treasurer of that company and subsequently was appointed general manager. In 1898 he was elected vice-president of the company and in 1902 he became second vice-president and general manager of the Philadelphia Rapid Transit Company. The various positions which he has held have given him a large knowledge of the engineering, operating and financial branches of the street transportation business and his election to the presidency of the Philadelphia Rapid Transit Company on September 15, 1909 followed seventeen years of practical experience. Mr. Kruger's residence is at Abingdon, Pa., where he is vice-president of the Board of Township Commissioners.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

LIBSON, PORTUGAL*

THE Lisbon Electric Tramways, Ltd., which operates the street railways in Libson, Portugal, was equipped for electric traction in the autumn of 1901. The car service is arranged so that almost the whole of the cars pass the Rocio (Praca de D. Pedro) which is practically the hub of the system from which all the suburban lines radiate. The principal routes are: Dafundo, on the west, running parallel to the River Tagus; Bemfica on the north-west and Lumiar to the north. These routes are each about five miles long and Brill double-truck semi-convertible cars are operated over them.

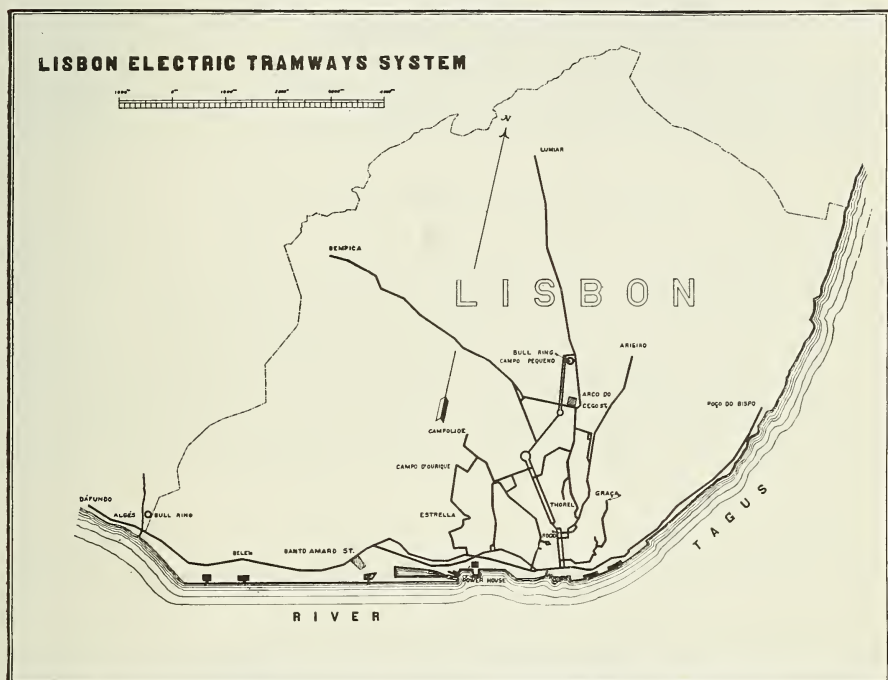
Arieiro is to the northeast, and Poco do Bispo towards the east, alongside the river. Both these routes have extremely narrow streets, and on the Poco do Bispo route there is also a very heavy carting traffic which prevents the use of double truck cars which although more suitable for negotiating curves, take up more space on the street than the small four-wheel cars. The latter are, therefore, exclusively used on the last two routes named. In the center of the town the service is entirely conducted by four-wheel cars on account of the narrow streets and for the reason that a closer headway with smaller cars serves the public better than large cars at longer intervals. All the circular routes are so arranged that the cars pass through the Rocio in both directions.

The system consists of about 29 miles of double track and 6 miles of single track, making about 35 miles of street. In addition, there are over six miles of sidings, which gives a total of about 70 miles of single track in all. To give some idea of the stiff nature of the grades, the Largo da Graca although only 1000 meters (3300 ft.) from the Rocio in a direct line, measures 2667 metres ($1\frac{2}{3}$ miles) by the track. The

* This is the fourteenth of a series of articles, commencing in the January 1909 number of Brill Magazine, which describe in a general way the type of car in many of the larger cities of the world, with information indicating the conditions which have been the influencing factors in the adoption of the several types. The cities considered in previous articles have been in order of the appearance of the articles: Philadelphia, New York, Detroit, Chicago, Baltimore, London, Washington, New Orleans, Boston, Denver, Atlanta, Portland, (Ore.) and Norfolk.

actual rise above the starting point is 76 metres (250.8 ft.) The other circular routes are much in the same proportion.

The steep gradients in some parts of the town and narrow streets render it necessary to have different types of cars. For instance, on the Graca and Estrella routes where there are as high as twelve per cent. grades for considerable distances and owing to the tortuous nature



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—On a Single Track Basis Lisbon Has 70 Miles of Electric Railway—The Principal Routes Are Dafundo on the West, Bemfica on the Northwest and Lumiar on the North

of some of the streets, it is impossible to operate any other kind of rolling stock but single truck cars.

In Libson, as in other continental cities, there is a very large increase in the number of passengers to be carried on Sundays and Saint days, compared with the ordinary week-day traffic, and as it is impossible to have double-deck cars on account of the narrow gauge, which is only 90 centimetres (2 ft. 11 $\frac{7}{16}$ in.), the cars in use seem to answer admirably the requirements of the public.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Brill Double-Truck Semi-Convertible Cars Are Used On the Suburban Lines of Lisbon Where the Streets Are Wide and Traffic Conditions Will Permit of Their Operation

The rolling stock of the company consists of the following: 240 electric passenger cars, 43 trail cars, 2 freight cars and 2 sprinkler cars. Seventy-five single deck closed cars were built by the St. Louis Car Company with a seating capacity for 20 passengers and accommodation for 11 passengers standing on the platforms. These are mounted on the Brill No. 21-E truck 6-ft. 6-in. wheel base and fitted with the Brill track brake. The closed cars are used principally in winter. Their weight is 8.9 tons.

Eighty eight-bench open cars built by The J. G. Brill Company with a seating capacity for 32 passengers and 4 standing on the rear



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Twelve-Bench Open Car On Brill Single Motor Trucks—There Are Forty Cars of This Type in Service in Lisbon Similar Cars With Eight Benches and Mounted on Brill No. 21-E Trucks, Are Used in the Center of the City.

platform. These cars are also mounted on 21-E Brill trucks with Brill track brakes and are generally used in the summer weather on the lines near the center of the town. Weight 8.3 tons.

For the suburban lines the company has 40 twelve-bench double-truck Brill open cars mounted on Brill Eureka single-motor trucks. These cars have a capacity for 48 passengers seated and 4 standing on the rear platform. They are mostly used in the summer weather and on holidays and Bull Fight days when a great number of people have to be handled quickly.

In addition to the above the company recently put 40 Brill semi-convertible cars on the suburban lines which have proved a great success. Twenty of them are mounted on Brill Eureka single-motor trucks No. 22, and are fitted with the General Electric Company's magnetic track brake. The second lot of twenty are mounted on Brill No. 27-GE 1 trucks and fitted with four motors and air brake equipment. In addition there are five second class ("Carro do Povo") cars mounted on Brill Eureka single-motor truck No. 22 with magnetic brake. These latter have a carrying capacity of eighty passengers.

The following is a tabular statement showing the principal dimensions of the standard types of cars with the weight of the equipment:

	8-Bench Open	12-Bench Open	28-foot Semi-Conv.	25-foot Second Class
Length over Corner Posts	16 ft. $2\frac{3}{8}$ in.	31 ft. $8\frac{3}{8}$ in.	28 ft. 0 in.	25 ft. 0 in.
Length over Crown Pieces	24 ft. $10\frac{3}{8}$ in.	36 ft. $2\frac{3}{8}$ in.	37 ft. 0 in.	38 ft. 0 in.
Width over Sills	5 ft. $10\frac{1}{2}$ in.	5 ft. $10\frac{1}{4}$ in.	7 ft. $4\frac{1}{2}$ in.	7 ft. $4\frac{1}{2}$ in.
Width over Posts	6 ft. $10\frac{1}{2}$ in.	6 ft. $10\frac{1}{4}$ in.	7 ft. 7 in.	7 ft. 7 in.
Seating Capacity	32 Passengers	48 Passengers	40 Passengers	40 Passengers
Truck Type	Brill No. 21-E	Brill No. 22	Brill No. 27-GE 1	Brill No. 22
Motors, Type and Number	2 GE 59	2 GE. 59	4 GE 59	2 GE 59
Weight Car Body	6,900 lb.	10,480 lb.	16,000 lb.	14,430 lb.
Weight Trucks	5,465 lb.	6,350 lb.	12,860 lb.	7,650 lb.
Motors and Other Equipment	4,250 lb.	4,300 lb.	8,140 lb.	4,300 lb.
Total	16,615 lb.	21,130 lb.	*37,000 lb.	26,380 lb.

The number of passengers carried by the Lisbon Electric Tramways during the twelve months ending on December 31, 1908, amounted to 45,990,432.

* The cars of similar dimensions, mounted on Eureka No. 22 trucks and with two motors instead of four, weigh 27,300 lbs.

HOW LIGHT WEIGHT EQUIPMENT BEHAVES IN SERVICE

A SEVERE TEN YEAR TEST

IN 1897, the Metropolitan Street Railway Company of New York City adopted as its standard type of equipment a 28-ft. closed car mounted on Brill No. 22 single motor truck and during the years from 1898 to 1906 it continued to order from The J. G. Brill Company cars of the same general dimensions and with only minor changes. The cars all measure 6 ft. 7 in. over sills, have longitudinal



HOW LIGHT WEIGHT EQUIPMENT BEHAVES IN SERVICE—The First of the Cars of the Above Type Was Built for the Metropolitan Street Railway Company of New York in 1897—During the Past Year 250 of Them Have Been Equipped With Prepayment Platforms and Given Another Life—Each Car Weighed Originally Complete Only 27,040 lb. or 751 lb. per Seated Passenger

seats, double sliding end doors and platforms 4 ft. 6 in. long over bumpers, which with the 28 ft. body gave them a length over all of 37 ft. The seating capacity of each car was 36 persons and as the weight complete with trucks and motors ready for operation, but with hand brakes, was 27,040 lb. the weight per seated passenger was only 751 lb.

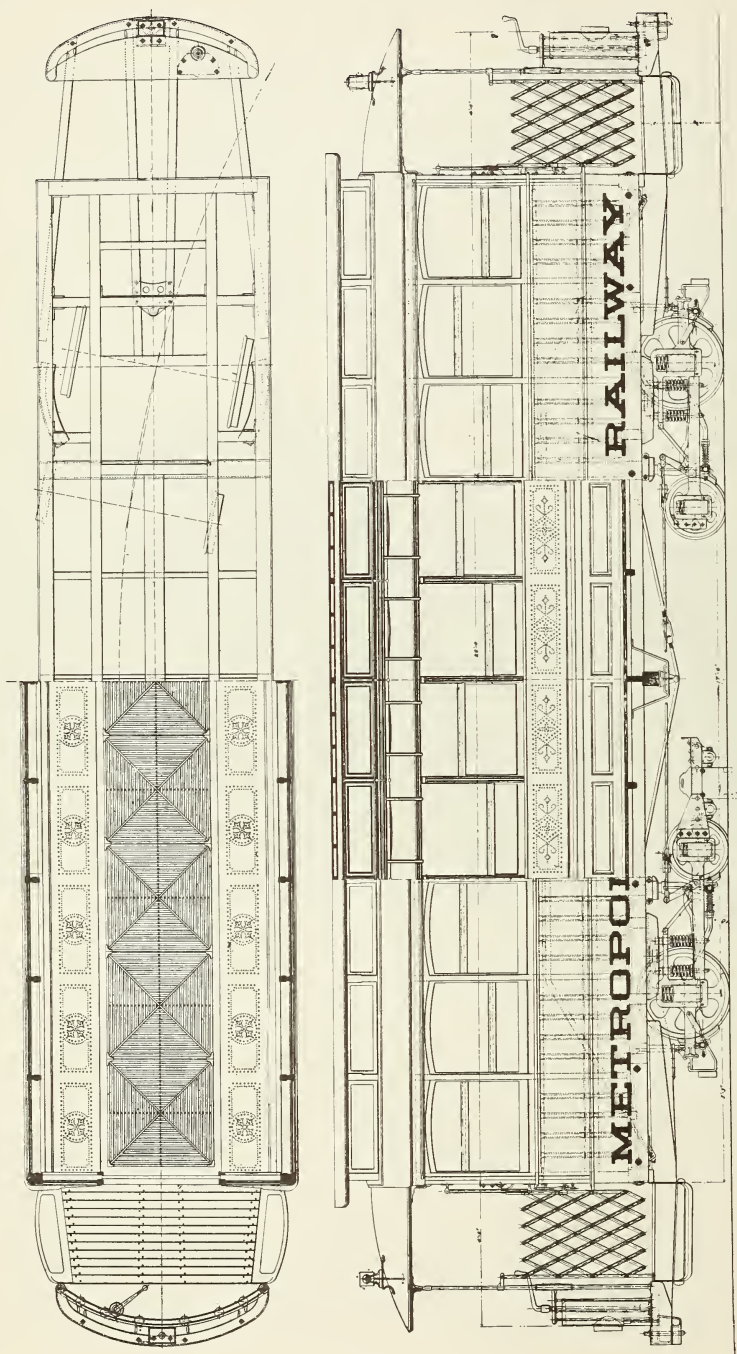
Under the direction of Mr. H. H. Adams, superintendent of rolling stock and shops of the Metropolitan Street Railway Company, 250 cars of the above type have been rebuilt for prepayment operation

in the shops of the company and it is interesting to note that after a long period of service no radical structural changes were required. The platforms were extended so that their length was 6 ft. 6½ in. over bumpers, making the overall length of the rebuilt cars 41 ft. 1 in. The increased length was secured by splicing the platform center and side knees and reinforcing them with ⅝-in. steel plates. The hood was also spliced and extended and the platforms, which had previously portable vestibules, were entirely vestibuled. On the long step side of each platform double folding doors were employed and on the short



HOW LIGHT WEIGHT EQUIPMENT BEHAVES IN SERVICE—One of the Cars Shown on the Opposite Page As Equipped With Prepayment Platforms—Except for the Lengthened Platforms and a Deepened Side Truss No Structural Changes Were Made—The Rebuilt Cars With Air Brakes Added Weigh Only 30,530 lb. or 763 lb. per Seated Passenger.

step or exit side a single sliding door was installed. The bulkheads were altered to provide for the doors which are necessary for the successful operation of the prepayment plan. To carry the additional weight incident to the increased length of the platforms, the side trusses of the cars were deepened 10 in. and a truss was built under the end sills in such a manner as to take in the platform centre knees. By installing a folding seat for three persons on one side of each platform and a folding corner seat for one passenger on the other side, the seating capacity of each car was increased to forty persons. These changes brought the weight of the rebuilt cars up to 30,530 lb. but of this weight approximately 1,500 lb. was covered by an air brake equipment



HOW LIGHT WEIGHT EQUIPMENT BEHAVES IN SERVICE—From 1897 to 1906 a Brill Car of the Above Type With Portable Vestibules Added Was the Standard of the Metropolitan Street Railway Company of New York.—The Length Over End Panels is 28 ft. and the Width Over Sills 6 ft. 7 in.—The Framing Has Stood the Test of Ten Years Service and is Still in First Class Condition

with which the cars had not previously been equipped. With the rated seating capacity of 40, the rebuilt cars accordingly have a weight per seated passenger of 763 lb.

It is worthy of mention that among the 250 cars which were rebuilt, there were cars constructed by The J. G. Brill Company in practically every year from 1897 to 1906, and all of these cars structurally were in first class condition. There was no indication of the sills breaking down and had the cars been shopped merely for a general overhauling instead of for reconstruction for prepayment operation no structural changes of any sort would have been required. The ten year service test is accordingly considered an effective proof of the principle for which The J. G. Brill Company has

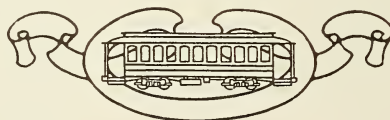
always stood, that light weight and strength could be embodied in the same design and should be in order to effect the greatest operating economy. It is hardly possible to conceive of a more exacting test of car construction than the severe conditions of Broadway service, where the cars are frequently loaded to the utmost capacity and where for a few years prior to the time the road was placed in the hands of receivers very little had been spent for maintenance of car equipment.



HOW LIGHT WEIGHT EQUIPMENT BEHAVES IN SERVICE—In Providing Prepayment Platforms An Extension from 4 ft. 6 in. to 6 ft. 6 $\frac{1}{2}$ in. over Bumpers Was Made—All the Original Material Was Used in the Reconstructed Cars

In view of the fact that the cars have seen practically ten years of service and have now been given another life, it may be interesting to describe the type of framing and construction in some detail. The accompanying line cut shows the general features of the framing. The principal underframing members are the side sills, which are of yellow pine $4\frac{3}{4}$ by $6\frac{3}{4}$ in. The crossings are $4\frac{1}{2}$ by $5\frac{1}{2}$ in. and the end sills, which are of white oak, are $4\frac{3}{4}$ by $6\frac{3}{4}$ in. These members are reinforced by intermediate sills and are securely tied together with rods of double refined iron. The original inside truss rod was 2 by $\frac{3}{8}$ in. and was 19 in. deep from top of floor to the bottom of the rod. The outside truss rods are $\frac{7}{8}$ in. in diameter with 1 in. ends, and pass below the side sill at the centre of the car body, extending from that point upwardly and running through the face of the end sill. The posts of the body framing have a sweep of $4\frac{1}{2}$ in. and are $2\frac{1}{16}$ in. thick, except for the corner posts, which are $3\frac{3}{4}$ in thick. There is a straining rod on each side of the car below the belt rail which passes through each side post and the corner posts and is made from $1\frac{1}{4}$ by $\frac{1}{4}$ in. refined iron.

The structural features as above stated were not changed except for the deepening of the inside truss rod. In working out the vestibuling and extensions of the platforms, however, there has been a careful consideration of the increased weight which as above noted, aside from the air brake equipment, amounts to only 2000 lb. One method by which reduction in weight was secured was by the elimination of the usual double panelled pocket for the sliding exit door. By the use of the single panel at this point not only was there a saving in weight but there is less glass to maintain and it is more readily cleaned and the door mechanism is accessible. In making the platform extensions the original platform material was largely used and the principal cost to rebuild the cars was the labor charge.



WAGON CARS FOR THE GUATEMALA RAILROAD

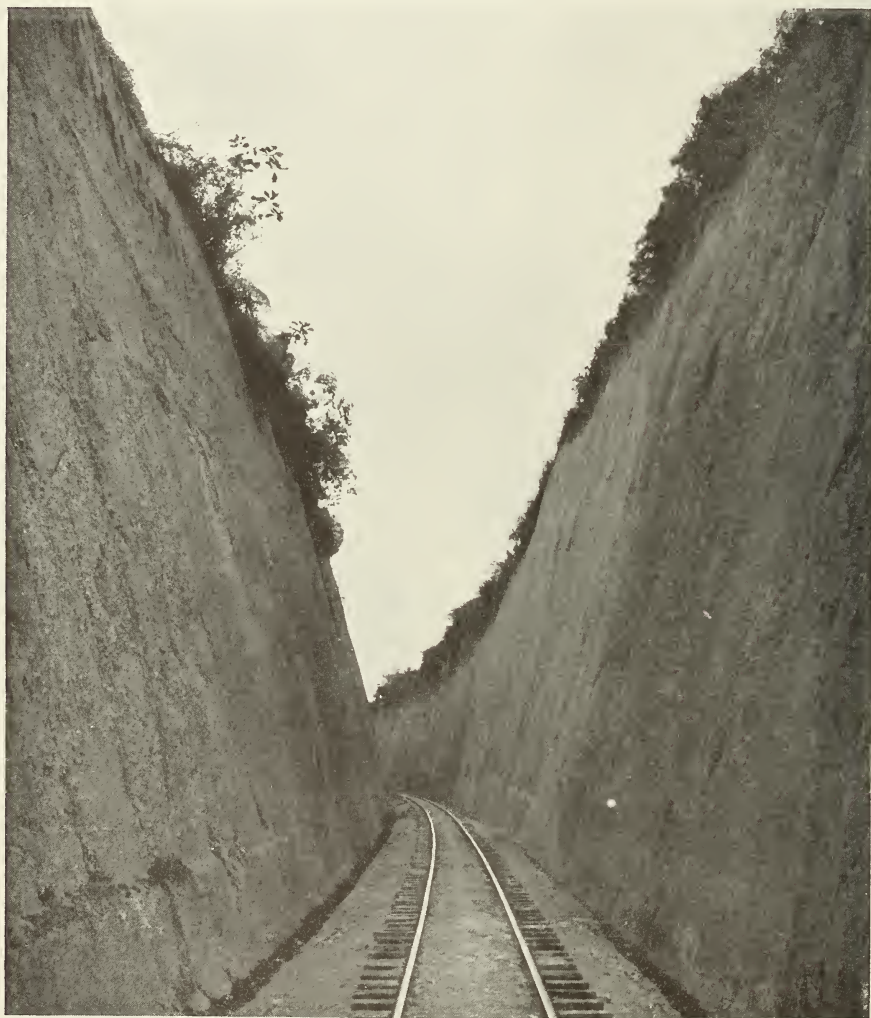
NARROW-GAUGE STEAM RAILWAY EQUIPMENT

THE Guatemala Railroad was opened to service early in 1908 and by connection with the Central Railroad of Guatemala completed the first transcontinental railway in Central America. The former road extends from Puerto Barrios to Guatemala City and has been known as the Northern Railroad of Guatemala. It is 194 miles long, is 36-inch gauge laid with 60-lb. rails and is well constructed with steel bridges and trestles throughout. The latter road extends from Guatemala City to San Jose on the Pacific Coast, from which considerable coffee is exported.



WAGON CARS FOR THE GUATEMALA RAILROAD—For Twenty-Eight Miles the Road Passes Through Over 8,000 Acres of Banana Groves

Relative to the Guatemala Railroad, the following facts have been given by Major General George H. Davis in report to the Department of State of the United States following his visit to Guatemala as Special Envoy Extraordinary and Minister Plenipotentiary at the time of the opening of the railway.



WAGON CARS FOR THE GUATEMALA RAILROAD—This Deep Cut, the Third East of Guatemala City, Gives Some Idea of the Obstacles Encountered in the Construction of the Road

“The first work of construction on the road was begun in the year 1871, and during the next fifteen years the line was completed, after a fashion, to El Rancho, a distance of 134 miles. The maximum grade in this portion of the road, which applies only to a crossing of a small summit, is $4\frac{1}{2}$ per cent, but this is to be reduced to 2 per cent.

“About three years ago the work of completion of the railroad was taken up by an American company of which Mr. Minor C. Keith is



WAGON CARS FOR THE GUATEMALA RAILROAD—One of the Largest Fills Along the Line
Near Trapich

president. Associated with him, and a large investor, is Sir William Van Horne. Mr. Keith is president of the railroad company and vice-president of the United Fruit Company, an American corporation which last year exported to the United States and Europe from Central and South America and Jamaica 40,000,000 bunches of bananas.

“The portion of the road referred to above extending from Puerto Barrios to El Rancho was three years ago impassable by even the



WAGON CARS FOR THE GUATEMALA RAILROAD—It is Not Surprising in View of the Scenic Attractions that the Management Has Ordered Three Observation Cars to Encourage Passenger Traffic

lightest trains. The track had never been ballasted; the railroad ties had almost entirely rotted away, and only the lightest kind of an engine and cars could pass over the track and this with the greatest difficulty. A large bridge across the Motagua River had been carried away. In fact the road was useless for any industrial purpose. The



WAGON CARS FOR THE GUATEMALA RAILROAD—The Tropical Wonders of the Jungle As Well As the Beauty of the Mountains are to Be Found Between the Terminals at Puerto Barrios and Guatemala

American company had transferred to it by concession by the Government the absolute ownership of the right of way, including switches, tracks and all material. It undertook to build the road and to equip it with modern appliances so that the purposes of the Government in its construction could be realized. Besides the lands composing the right of way and terminals 165,000 acres near the northern terminus, adapted to the cultivation of bananas, was given as a subsidy. The government has also guaranteed net earnings of 5 per cent. on the investment of \$4,500,000 in the road, to apply for a period of fifteen years from the date of its opening. The concession grants to the



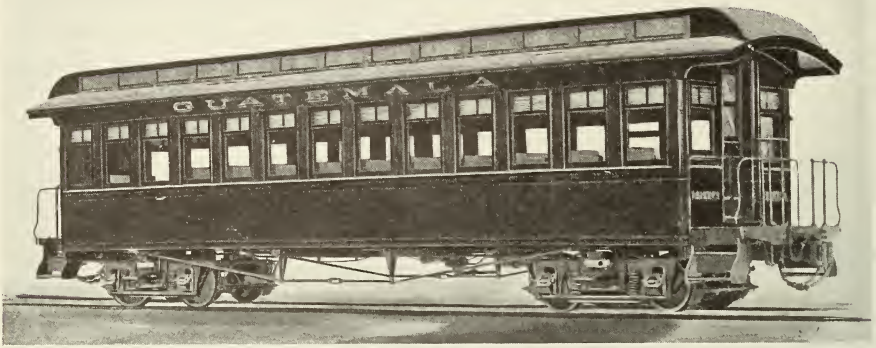
WAGON CARS FOR THE GUATEMALA RAILROAD—The Las Vegas Viaduct is Probably from an Engineering Standpoint, the Most Important of the Modern Steel Structures of Which There Are a Number of Considerable Interest

company the right to charge rates which are far above any that the management, in its own interest, will put into effect. It has very valuable terminal facilities, not only on the east coast but in the capital and at the way stations.

“From Puerto Barrios inland for about 60 miles the country is but slightly elevated above the sea and is admirably adapted to banana culture as well as for cattle raising and lumbering, the forests containing vast quantities of valuable woods which some time will be marketed. For the remaining distance, say 135 miles, the country is dry and sterile. The towns and villages situated along the line of the road are few and of very small populations. The principal of these towns is Zacapa, which has a population of about 5,000 souls. It is situated in the valley of the Motagua, a stream of very considerable proportions, the waters of which may at some time be distributed over the arid plains adjacent, the soil of which, as shown by limited irrigation, is extremely fertile. There are many thousands of acres of this land that can be readily irrigated, all well adapted for the cultivation of bananas and sugar cane.

“At Zacapa a tributary stream comes in from the eastward, the sources of which are quite near the Salvadoran frontier. A preliminary survey for a branch railroad projected to reach a large and fertile coffee-growing district in Salvador has been completed and a concession from the Government of Guatemala and Salvador has, it is understood, been secured by the American company of which Mr. Keith is president.

“As respects the business which this railroad system will serve, it is important to observe the following; Guatemala produces annually an average of 600,000 or 700,000 bags of coffee of 100 pounds each. This is grown principally on the Pacific slope of the Sierra Madre Mountains. Previously it has been exported from the Pacific ports of the Republic—San Jose, Champerico, and Ocos. The railroad company is confident that a considerable portion of this coffee, the principal export of the Republic, will be sent to the market via Puerto Barrios, for the distance from that point to the coffee markets in the United States and Europe is but about one-fourth the distance over which the coffee has previously been conveyed via the Straits of Magellan, and the time that will hereafter be consumed in its delivery



WAGON CARS FOR THE GUATEMALA RAILROAD—Two First and Two Second Class Coaches on All Steel Trucks Have Been Delivered—The Exterior Appearance of Both Types of Equipment is the Same

at ports of destination will not be more than one-fourth of that required to forward those cargoes around the extremity of South America.

“The coffee district of the west coast, previously referred to, is now traversed by the Central and Occidental railways, the former connecting Guatemala with the seaport of San Jose, with a branch of the same road extending west some 60 miles in the coffee district throughout. The seaport of the Occidental Railway is Champerico, and these two lines of transportation connect at Mazatenango, and they constitute a link in what will ultimately become the Intercontinental or Pan-American Railway, extending from Mexico to the Isthmus of Panama and beyond.



WAGON CARS FOR THE GUATEMALA RAILROAD—The Baggage and Mail Car Corresponds in General Dimensions to the Other Equipment

“On the lower 60 miles of the Guatemala Railroad, in the region adapted for the cultivation of bananas, some 8,000 acres are now planted—an area which will be extended as rapidly as the demands may require—and the traffic which will be built up by this cultivation and the transportation of valuable woods in the adjacent forests will be a source of large revenue for the railway company. The growth of the



WASON CARS FOR THE GUATEMALA RAILROAD—Interior of One of the Second Class Coaches Which Are Finished in Quartered Oak—The First Class Coaches Have Transverse Seats and are Finished in Mahogany

banana business of the world, and especially the consumption of this fruit in the United States, has been phenomenal. The United Fruit Company, an American corporation, is now operating over 100 steamers in the business. As above stated, the bananas marketed last year by this company reached an aggregate of 40,000,000 bunches and by other interests some 12,000,000 or 15,000,000 bunches more, and the growth of this trade during the last ten years has been a very rapidly advancing one.”

During January, 1910, the Wason Manufacturing Company ship-



WAGON CARS FOR THE GUATEMALA RAILROAD—Interior of Postal Compartment of Baggage and Mail Car

ped two first class coaches, two second class coaches and a baggage and mail car for the Guatemala Railroad and in addition it has an order for the road and will ship during the month of February a business car and three observation cars. The coaches are alike in exterior appearance and both coaches and baggage and mail car have the same general dimensions, which are as follows:

Length of body over end sills	35 ft.	
Length of body over platform end pieces	40 ft. 4	in.
Length of car inside	34 ft. 3	in.
Length of platform longitudinally	2 ft. 8	in.
Width of car inside	7 ft. 3½	in.
Width of car over sills	8 ft. ½	in.
Width of car over sheathing	8 ft. 2	in.
Height from top of rail to centre of drawbar	2 ft. 2	in.
Height of car from floor to ceiling	6 ft. 9	in.

The underframing of all of the cars comprises 7-inch channel side sills, two 7-inch I-beam centre sills and 6-inch I-beam intermediate sills. The end sills are reinforced with 6-inch I-beams. The needle beams are 6-in. by 4¼ in. of first quality white oak.

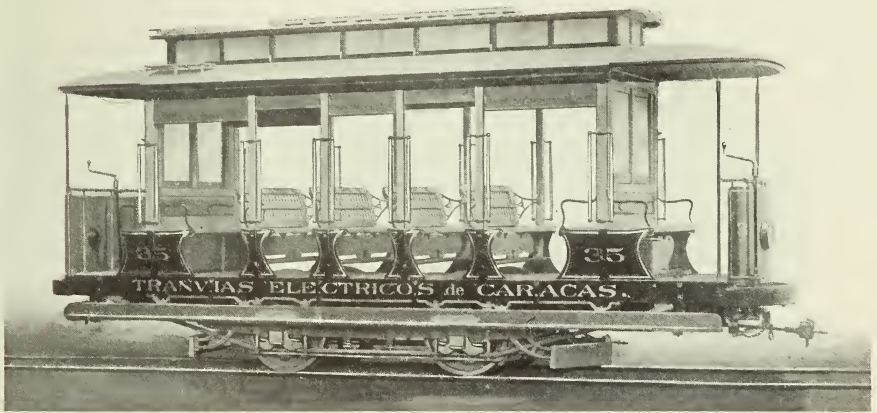
The first class coaches have mahogany interior finish and 21 reversible seats upholstered in rattan. The second class coaches have quartered oak interior finish and longitudinal seats of the type shown in an accompanying illustration. The combination baggage and mail cars have a plain interior oak finish.

The cars are mounted on four-wheel trucks of the M. C. B. type and of all metal construction and have the side bearings outside of the frame. The wheel base is five feet and the gauge three feet. Triple elliptic springs are used and 26-inch steel tired wheels mounted on axles with $3\frac{3}{4}$ by 7-inch journals.



SOME RECENT TYPES OF OPEN CARS SUMMER AND EXCURSION EQUIPMENT

THE accompanying engravings show a number of types of open cars built by the Brill Companies in 1909, which means that the cars represent the latest practice in equipment for summer service. The three types of single truck cars which are shown, range from the short 8-bench car for Caracas, which is

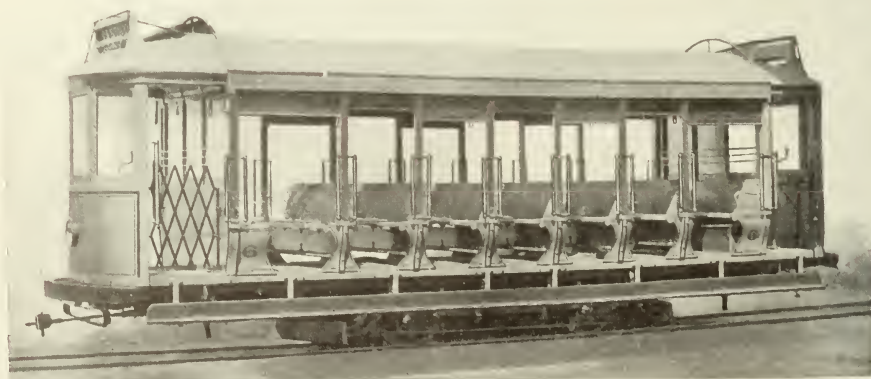


SOME RECENT TYPES OF OPEN CARS—Eight-Bench Car on Brill No. 21-E Truck—A Standard Type of Single Truck Open Car and Especially Adaptable for Narrow Gauge Service—Length over Dashers 22 ft. 10½ in.

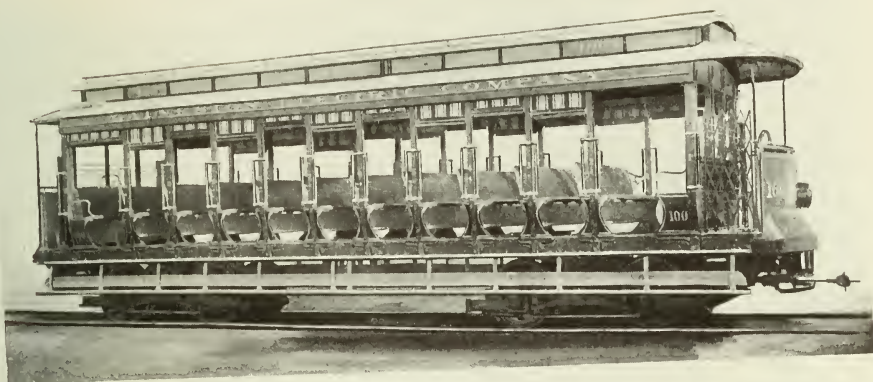


SOME RECENT TYPES OF OPEN CARS—Eight-Bench Car on Brill No. 21-E Truck Built for the United States Military Reservation, Corregidor, Phillipine Islands—Length over Bumpers 27 ft. 8 in.

mounted on a Brill No. 21-E truck with a 6-ft. wheel base, to the 10-bench car built for the United States Government military reservation on Corregidor Island and mounted on a Brill No. 21-E truck with a 7-ft. 6-in. wheel base. The latter car has the largest seating capacity of any open car which can be carried on a single truck and not exceed the limits of good practice and the truck on which it is mounted has a wheel base which is a good standard for average conditions taking into consideration track curvature, riding qualities of the car and effect of the loaded car on track and roadway. The 8-bench car without monitor



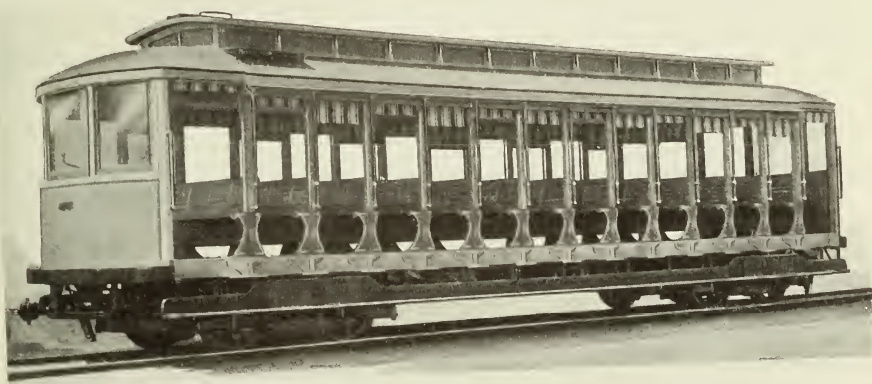
SOME RECENT TYPES OF OPEN CARS—An Interesting Type of Eight-Bench Open Car Which Has An Extensive Use in Foreign Cities—Mounted on Brill No. 21-E Truck—Length over Vestibules 28 ft. 8½ in.



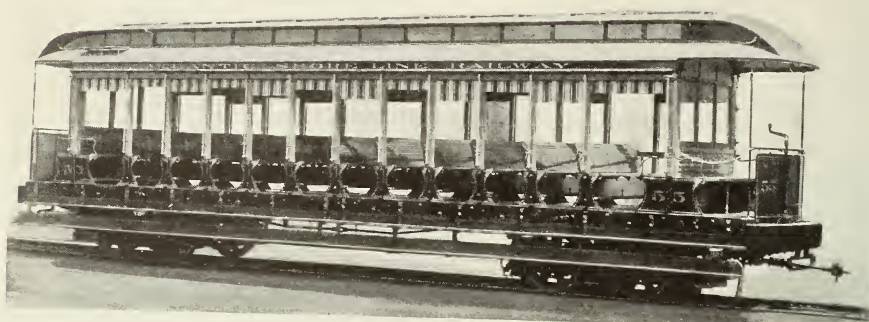
SOME RECENT TYPES OF OPEN CARS—Twelve-Bench Car With Brill Patented Narragansett Sill Step—
Built for the Galveston Electric Company by the American Car Company and Mounted on
Brill Trucks—Length over Bumpers 37 ft. 6 in.

roof, which was built for Bogota, Columbia, is an interesting type and one which is quite generally used in foreign cities. American managers with a very few exceptions, however, have not been disposed to adopt the arch roof either for open or closed cars and have apparently preferred to spend a few dollars more per car for the somewhat better appearing monitor roof car rather than to economize in first cost.

Among the double truck open cars, there is both a wide range of seating capacity and considerable variation in the various features. Yet



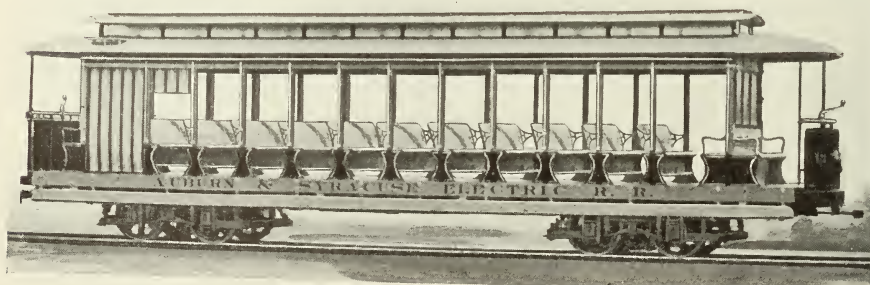
SOME RECENT TYPES OF OPEN CARS—Thirteen-Bench Car With Brill Patented Narragansett Sill Step
Built for the Conestoga Traction Company—An Unusually Fine Type of Open Car
Length over Vestibules 39 ft.



SOME RECENT TYPES OF OPEN CARS—Fifteen-Bench Car for the Atlantic Shore Line Railway—The Steam Coach Roof and the Double Running Board Are Distinctive Features—Length over Dashers 40 ft. 1 in.

a very distinct division can be made between the open cars with running board and the open cars with end entrance only and a center aisle. With consideration of the running board equipment, the car of lowest seating capacity is the 12-bench Narragansett car for the Galveston Electric Company. The use of the Z-bar side sill which is characteristic of the Narragansett car, not only facilitates the boarding and alighting of passengers by providing an extra step which is entirely within the line of the car body, but makes it entirely feasible to use large diameter wheels, which are a decided advantage and economy where the cars are required to operate at a maintained high speed on suburban lines or in excursion service.

The double-truck car, which comes next in order of seating capacity, is also a Brill patented Narragansett car and was built for the Conestoga

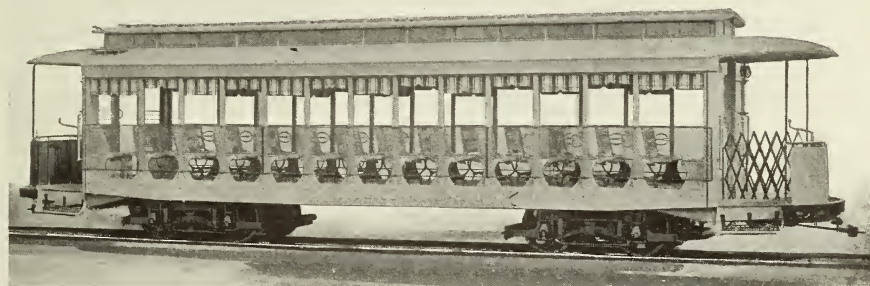


SOME RECENT TYPES OF OPEN CARS—A Standard Type of Fifteen Bench Car—Built by the G. C. Kuhlman Car Company—Length over Dashers 41 ft. 8 in.



SOME RECENT TYPES OF OPEN CARS—Interior of the Car Shown Below—The Use of the Center Aisle Reduces Seating Capacity But the Standing Room is Ample and Unobstructed

Traction Company. It has 13 benches and it is interesting to note that the room required for the extra bench seating five persons is only 3-ft. of additional length over the 12-bench car, the length of the



SOME RECENT TYPES OF OPEN CARS—End Entrance Center Aisle Open Car Seating 56 Persons—This Type of Equipment Does Away With the Danger from Running Board Accidents—Length over Dashers 46 ft.

cars for Galveston being 36-ft. over dashers, whereas the cars for the Conestoga Traction Company are 39-ft. over vestibules. The 13-bench cars also have all of the benches reversible, whereas the 12-bench cars have two fixed benches built against the end bulkheads.

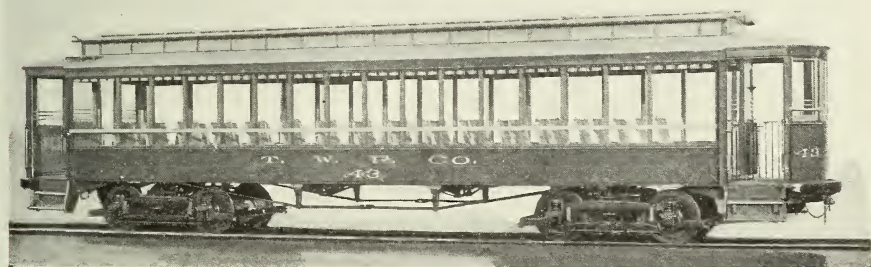
The two 15-bench cars with running board are distinctively different in the type of roof and in the fact that the car for the Atlantic Shore



SOME RECENT TYPES OF OPEN CARS—Interior of a Type of Equipment Used by the Tidewater Power Company—The Car is Well Finished and Has Brill Winner Seats—In the South the Car Can Be Used Almost the Year Around

Line has a double running board. This latter feature accomplishes the same purpose as the Z-bar sill of the Narragansett car as far as the reduction in step heights is concerned, but it has none of the advantages of the Narragansett car with respect to increased sill strength, and in addition the projection of the lower running board beyond the line of the car is necessarily increased. The two types of center aisle and end entrance cars were both built for electric railways in the south. The car with entirely open sides was built for the Charleston (S. C.)

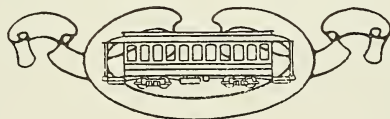
Consolidated Railway, Gas & Electric Company. The sides are protected by a 30-inch wire screen, the bottom of which is 6 inches from the floor. The striped duck curtains extend from letter board to sill when lowered. There is a single sliding door and two window sashes in each bulkhead. The seating capacity of the car is 56 persons, there being 24 Brill reversible seats and four fixed seats against the bulkheads. The ceiling of the car both at the sides and in the



SOME RECENT TYPES OF OPEN CARS—A Good Type of Open Car for Excursion Service On Interurban Lines—Seating Capacity 68 Persons—Length over Vestibule 40 ft. 6 in.

monitor deck has a carline finish, though advertising moldings are provided for 11-inch cards.

The car with semi-enclosed sides was built for the Tidewater Power Company of Wilmington, N. C. This car has a number of features not shown in the other type of equipment, notably the vestibuled ends and the ceiling with full headlining. The Brill Winner seats have wood slat backs instead of spindle backs. The car seats 68 persons.



A FURNITURE VAN OF THREE AND ONE-HALF TONS CAPACITY

GAS-ELECTRIC TYPE

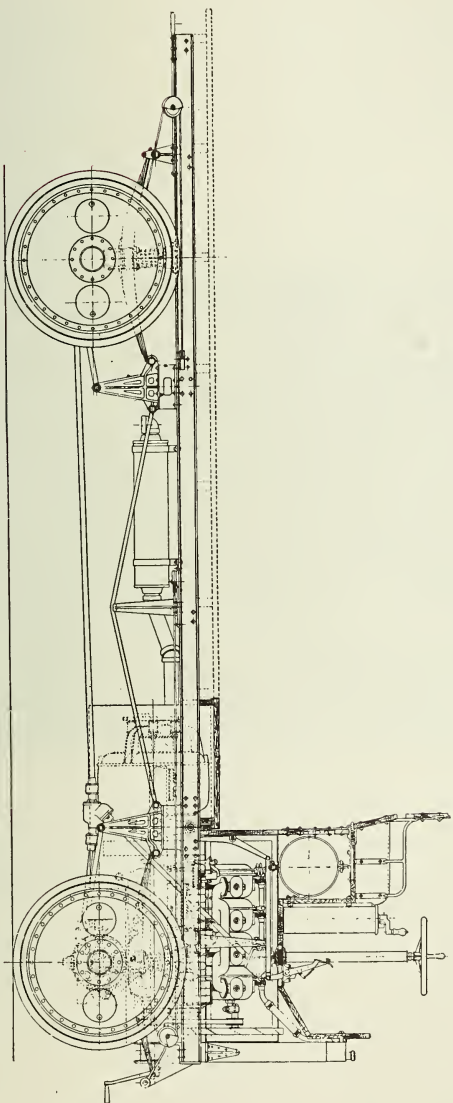
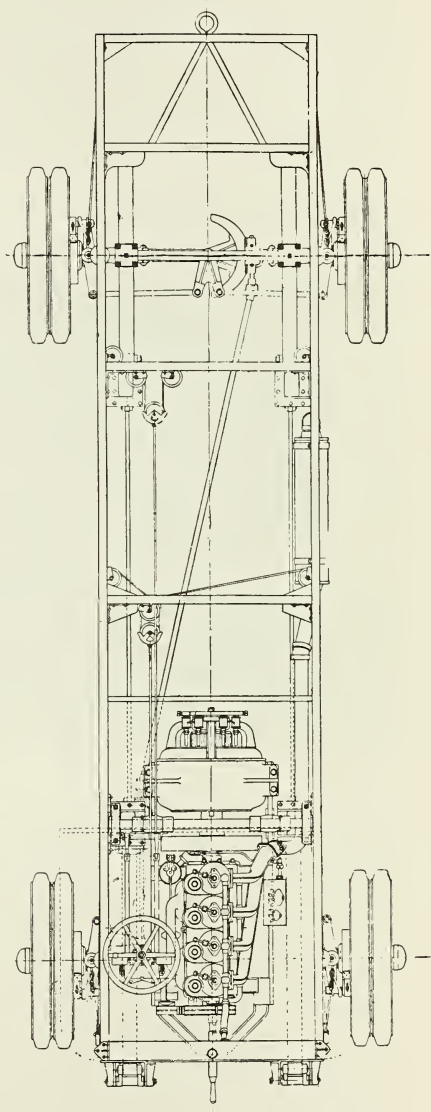
THERE are few electric railways which would be possible purchasers of furniture vans. Some roads could use similar equipment to advantage in connection with a delivery service organized to develop freight and express traffic and there are one or two instances where roads in the United States have developed a "moving by trolley" business and these roads might use furniture vans in handling the household goods of patrons living at some distance from their lines.

A furniture van built recently by the The J. G. Brill Company has a steel sheathed body of the following dimensions:

Length of body inside	14 ft. 9 in.
Width of body inside	5 ft. 4 in.
Height of body inside at ends	6 ft. 11 in.
Length of body outside front bulkheads to outside doors .	15 ft. 1 in.
Width outside body	5 ft. 6 in.

The framing of the body is of ash and the sheathing $\frac{1}{8}$ -inch cold rolled steel. The inside lining is $\frac{1}{32}$ -inch sheet steel. The roof is arched transversely and longitudinally and covered with $\frac{1}{64}$ -inch sheet steel. The ceiling has $\frac{1}{64}$ -inch sheet steel applied to the under side of the carlines.

The motor and chassis equipment was delivered to the plant of The J. G. Brill Company by the Couple-Gear Company of New York, by whom the completed equipment was sold to the Harlem Storage & Van Company, also of New York. The chassis is of channel iron construction with deep longitudinal trusses and is carried on semi-elliptic springs. The motor equipment comprises a 4-cylinder gasoline engine of the automobile type with cylinders 5 inches in diameter by $5\frac{1}{2}$ -inch stroke and of 50 horsepower rated capacity. It is directly connected to a 12 kw. generator of the 6-pole commutating type. The current is conducted from this power unit through suitable wiring to the four driving motors of 3 h. p. each which are contained in the four driving



A FURNITURE VAN OF THREE AND ONE-HALF TONS CAPACITY—Plan and Elevation Showing the Couple Gear Arrangement and the Gas-Electric Generating Unit

wheels. The manner in which the motor drive is applied to the wheels is the particularly interesting feature of the truck. The axle stub on which the wheels turn is integral with the motor castings and an elongation of the inside stub is keyed in a sleeve in the steering knuckle and this holds the motor in a fixed horizontal position while the wheel revolves around it. The force of the motor is applied to the rim of the wheel at two opposite points by two pinions, which engage halves of a double cog rack while they remain free of the other half. This enables



A Gas-Electric Furniture Van of Three and One-half Tons Capacity

them to work from their opposite sides and to thereby cause the wheel to revolve. There is a balanced division of the work between the two pinions accomplished by a rocker device in the armature shaft.

The van body as completed and delivered from the plant of The J. G. Brill Company weighed 3360 lbs. and the weight of the chassis and body complete in running order was 11,000 lbs. The car was delivered to its destination on its own wheels and made the run from Philadelphia to New York by a route, according to cyclometer measurement, 120 miles long in 12 hours with a gasoline consumption of 20 gallons, without operating troubles of any sort.

BRILL MAGAZINE

Published on the fifteenth
of each month by the

PUBLICITY DEPARTMENT OF THE J. G. BRILL COMPANY

In the interests of The J. G. Brill Company, American Car Company, John Stephenson Company, G. C. Kuhlman Car Company, Wason Manufacturing Company, Danville Car Company.



GEORGE BRILL, one of the sons of the founder of The J. G. Brill Company and one of the principal stockholders of the company, died on January 30, 1910. Mr. Brill had led a life of devotion and close application to business and for sixteen years to the affairs of The J. G. Brill Company and after the lapse of that period he felt that he was entitled to withdraw from the cares of active business and to enjoy the fruits of his efforts. In June, 1909 he did withdraw after arranging to install a worthy substitute in the person of his son Byron O. Brill. George Brill was endowed with an earnestly industrial disposition, unflagging energy, intelligence of a most practical kind, a handsome robust physique and a kindly manner.



FOR years The J. G. Brill Company has favored light equipment for the reasons of operating economy which nearly all managers so fully appreciate at present. But not many years ago, there was a demand for heavy cars. Engineers and managers were anxious to build equipment that was strong and durable, that would require little expense for maintenance. As a result an appreciable number of the cars produced in Brill plants were for a time heavier than we considered good practice. We yielded largely to the demands of the purchaser and in many cases we have shouldered the blame—for the car builder gets the blame regardless of who is responsible for the design of car—which the owners have heaped upon us for allowing them to acquire a white elephant of operating expense. During the time when heavy cars were the vogue, one of the principal arguments was that a light car would not stand the strain of hard service, that the framing would break down and that generally the car would be a continual expense for up keep. Our contention was that cars to stand the most severe service could be built both light and strong. Necessarily at that time there was little actual proof that cars of that character would have a long and effective service; but to-day we can point with pride to an instance where a characteristic light weight product of the Brill plant has given emphatic evidence of its good condition after

extended service. On another page will be found a description of the manner in which a lot of 250 Brill cars built between 1897 and 1906 for the Metropolitan Street Railway Company of New York City have been equipped with prepayment platforms and made thoroughly modern from an operating standpoint and are now in condition to give their owners another useful life. These cars average much lighter than the equipment used in the majority of cities in the United States, they have had ten years' service of a character to test the most substantial car that could be built, they are still in good condition. And, what is more to the interest of the purchaser of cars to-day, The J. G. Brill Company is better prepared by experience and resources to build to-day cars of an equal or higher standard of strength and lightness than it was when those cars were constructed.



ON another page of this issue, mention is made of a shipment of cars by the Wason Manufacturing Company to Guatemala. Last month there were described some cars now in service in Porto Rico which were built by The J. G. Brill Company, and similarly in almost every issue of Brill Magazine there appears an article describing cars and trucks, built by one or another of the Brill companies, which have been exported to some

foreign country. These articles to some extent chronicle the more important foreign orders, but they are not an index of the volume of export business done by The J. G. Brill Company and allied companies, for each month there is a quantity of orders for several trucks, one or more cars, or other equipment, which as individual items are scarcely worthy of mention, but which in the aggregate form a respectable percentage of the gross business for the month. The extent of the foreign orders indicates a number of things, not the least of which is the fact that American electric railway equipment is practically the standard throughout the world, and as the largest manufacturer of cars and trucks in the United States, we feel that it is not beyond the mark to say also that the orders indicate that Brill cars and trucks are the standard of the world. The volume of foreign business done by The J. G. Brill Company has increased from year to year with the growth of the company along other lines and as the foreign business has grown we have added to our experience in handling the many details of foreign orders. This experience we sincerely believe has given us an organization and system, which though admittedly imperfect, is yet the best in the United States with respect to the handling of export orders for cars and trucks. It is our hope and endeavor to make it as nearly perfect as human fallibility will permit.

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London Office

110 CANNON STREET, E. C.

Cable Address: "AXLES," London.

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St. Louis, Mo.

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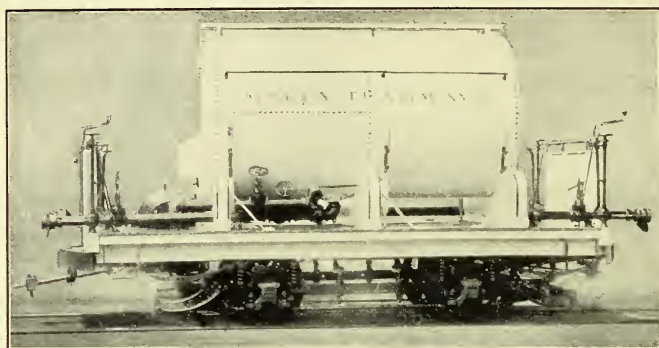
Milan

China

SHEWAN TOMES & CO.

Hong Kong, Canton

Shanghai



BRILL CENTRIFUGAL SPRINKLER

The Brill Centrifugal Sprinkler is equipped with a centrifugal pump which is driven by a 20 h. p. motor. By actual test this equipment will sprinkle evenly from curb to curb of a street 70 feet wide. The sprinkling heads can be adjusted to deliver the finest spray or a heavy stream, the range of which can be readily controlled. We have some data to show how the Brill Centrifugal Sprinkler can be used to earn you a net income and improve operating conditions. If you need more money, call on us for information.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE

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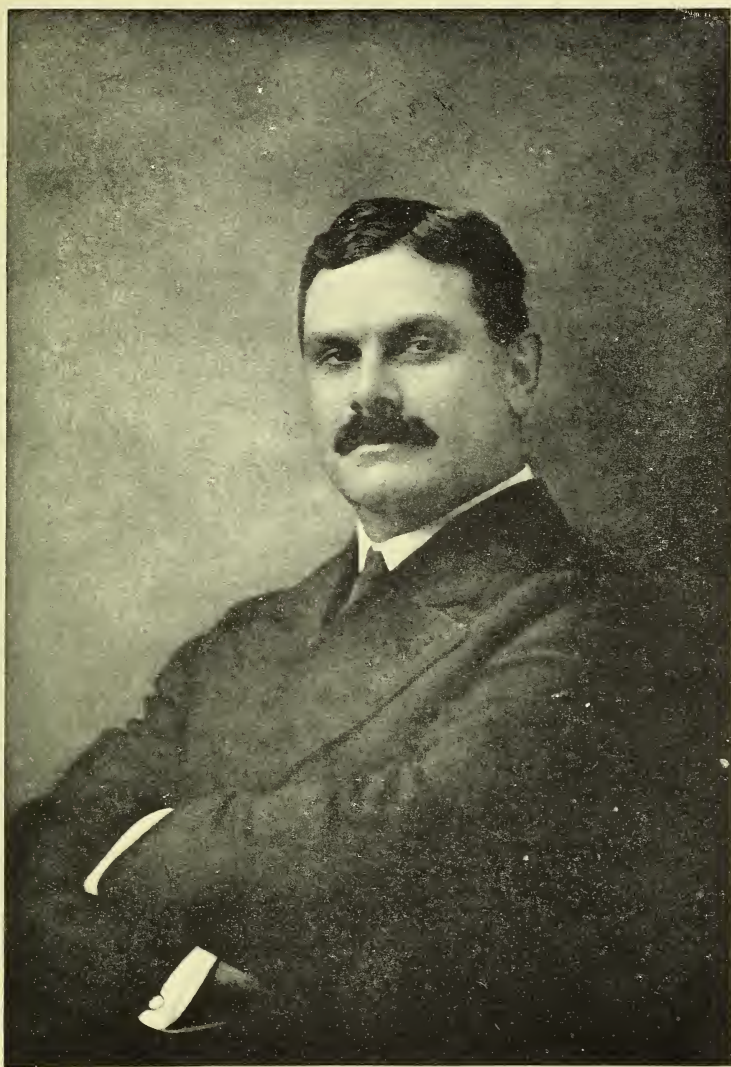
Via Dante
Milan, Italy

TO
TRAMWAY MANAGERS
AND
ENGINEERS

IN EUROPE AND OTHER FOREIGN COUNTRIES

The J. G. Brill Company desires to immediately correct the erroneous impression that a Brill "TYPE" of truck is necessarily a truck made by The J. G. Brill Company. A practice has been adopted of offering to tramway committees, a truck *called* a Brill "TYPE" of truck, when the real intent of the specifications is for the supply of a Brill truck manufactured by The J. G. Brill Company. The distinction is an important one because The J. G. Brill Company's trucks are standard on most of the important tramway systems in the world—a reputation achieved solely by the high class material and workmanship employed by The J. G. Brill Company and the inherent merits of the design. The J. G. Brill Company urges managers and engineers in their own interest to differentiate strongly between the trucks as made by The J. G. Brill Company and copies of the Brill truck embodying inferior material and workmanship and sold as the Brill "TYPE" of truck. All genuine Brill trucks bear The J. G. Brill Company's name plate and shop order number. We caution any contractor or contractors offering a Brill "TYPE" of truck as a Brill truck.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



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No. 3

C. LOOMIS ALLEN

CLOOMIS ALLEN, president of the Syracuse & Suburban Railroad Company and a director of the New York State Railways, was born in Syracuse, New York, in 1870 and was educated in the common schools of Syracuse and in the district school of Cicero, Onondago County, New York. From 1886 to 1889 he attended Alfred University, and for a short time he was a student at Syracuse University. In 1890 he entered the employ of the Norfolk & Western Railway as axeman and after holding various positions in the engineering department, he resigned to engage in general civil engineering practice as a member of the firm of Mather & Allen. During the period from April, 1892 to April, 1895 the firm had charge of the civil engineering work in connection with electrification of the horse railways in the city of Syracuse and extensions of the Syracuse City Railway. Between April, 1895 and March, 1898 Mr. Allen was civil engineer of the Syracuse Street Railway, the Syracuse Consolidated Street Railway and its successor the Syracuse Rapid Transit Company and had charge of the reconstruction of the track and overhead lines of some 64 miles of road. From March, 1898 to December, 1899 he held successively the positions of assistant general manager, acting general manager and general manager of the Syracuse Rapid Transit Company, resigning to become general manager of the Lorian (Ohio) Street Railway. On August 1, 1901, he became engineer and assistant to the general manager of the Utica & Mohawk Valley Railway and on April 15, 1902 general manager of that railway and also of the Oneida Railway Company and the Rome City Street Railway Company. In December, 1906, he was elected to the following positions which he now holds: vice-president and general manager of the Syracuse Rapid Transit Company, Utica & Mohawk Valley Railway, Oneida Railway and the Rome City Street Railway. On January 14, 1909 he was elected president of the Syracuse & Suburban Railway Company.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

MILAN, ITALY*

LIKE many cities of continental Europe, the center of activity of Milan is the cathedral square and as is frequently the natural sequence, the tramway system has its focus at that point. All of the tramway lines of Milan except three start from the Piazza del Duomo (the cathedral square) and from that point they radiate in all directions. Several of them run to the various railway stations and others traverse the radial or diagonal streets, which are characteristic of Milan, passing through the gates of the wall which encircles the original city of the sixteenth century and extending to points beyond the city limits. The three lines which do not start from Piazza del Duomo are a line connecting three railway stations, another which encircles the city and a third from Porta Volta to the Musocco Cemetery.

The fare on each of the lines starting from the Piazza del Duomo is 10 centesimi (2 cents). The line which encircles the city is divided into five sections or zones and the fare of each of these sections is 10 centesimi. The other lines are also operated on the zone system except the line from Porta Volta to Musocco Cemetery, on which the fare is 15 centesimi (3 cents). For the benefit of the working and the poorer classes, the fare is 5 centesimi (1 cent) on each line from the Piazza del Duomo and on each section of the other lines before 8 a. m. in the summer and 9 a. m. in the winter.

The basis of relations between the Societa Generale Edison di Elettrocita which operates the Milan tramways and the city is very similar to that embodied in the so-called Chicago plan. The contract which was made over 10 years ago runs for 20 years. The tracks for the tramways were laid by the municipality and transferred to the operating

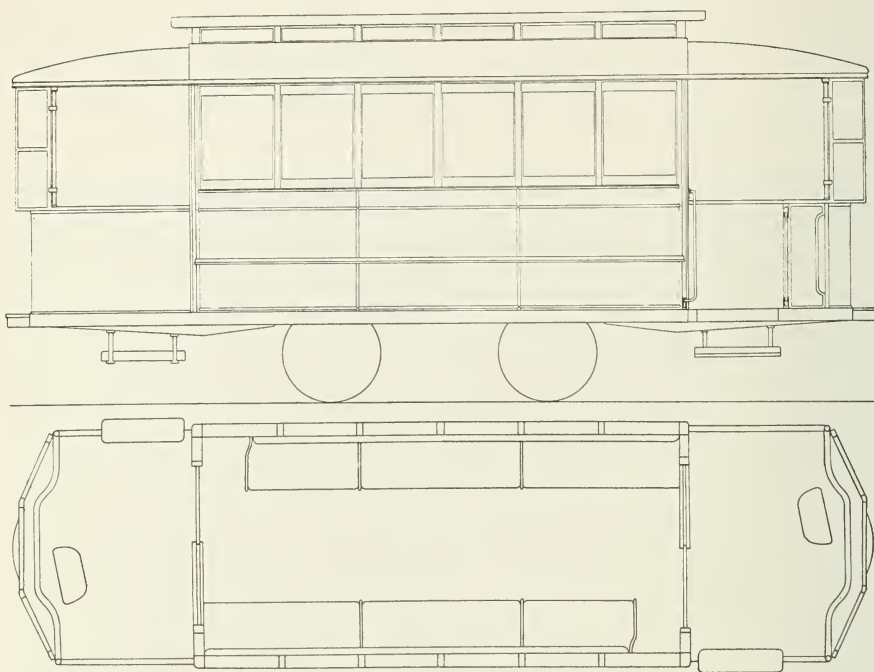
* This is the fifteenth of a series of articles, commencing in the January 1909 number of Brill Magazine, which describe in a general way the type of car in many of the larger cities of the world, with information indicating the conditions which have been the influencing factors in the adoption of the several types. The cities considered in previous articles have been in order of the appearance of the articles: Philadelphia, New York, Detroit, Chicago, Baltimore, London, Washington, New Orleans, Boston, Denver, Atlanta, Portland, (Ore.) Norfolk and Lisbon, Portugal.

company for 4,500 lire for each kilometer or \$686. for .62 miles of single track. The operating company which furnishes the power for the tramways and also for lighting and other purposes receives from the municipality 25½ centesimi for each car per kilometer or approximately



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Population of Milan is About 500,000—The Tramway System Has Its Center at the Cathedral Square from Which Lines Radiate in all Directions

5 cents per .6 mile. From the total yearly receipts are deducted the amounts paid by the operating company to the municipality for the use of the property, privileges, etc., and by the municipality to the company and the remainder is divided 40 per cent to the company and 60 per cent to the municipality.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Standard Car of Milan Seats 18 Passengers—The Platforms Are Protected By Gates and Only One Gate is Open At a Time

The standard car of the Milan tramways is of the single truck type and has longitudinal seats. The platforms have vestibuled ends and are equipped with gates which are closed when necessary to prevent overcrowding; though there are no regulations in Milan, as in some foreign cities, which prohibit the cars carrying more passengers than there are seats. To the minds of American managers the cars are exceedingly short, but the management explains that the frequent changing of passengers boarding and alighting on a short run will not permit the proper distribution of tickets if the cars are longer. If a longer car were used it would be necessary to put two conductors on each car which is not feasible or practicable. When the traffic is extra heavy a trail car with conductor is used. The bulkhead doors, which are of the sliding type, it will be noted, have the easy access arrangement which proved so satisfactory in America before the advent of the Pay-As-You-Enter car.

The following are the principal dimensions and features of the standard car of the Milan tramways:

Length over end panels	13 ft. 10½ in.
Length over platform	22 ft. 6 in.
Width over posts	6 ft. 2¾ in.
Extreme width	7 ft. 0¼ in.
Seating capacity	18 persons
Truck wheel base	5 ft. 11 in.
Wheel gauge	4 ft. 8⅞ in.
Weight car body	7,387 lb.
Truck	4,851 lb.
Motors, etc.	8,820 lb.
Total	21,058 lb.

The weights as given cover a car with two motors. Some of the cars have a single motor equipment weighing 5512 lb. and weigh complete approximately 17,632 lb.

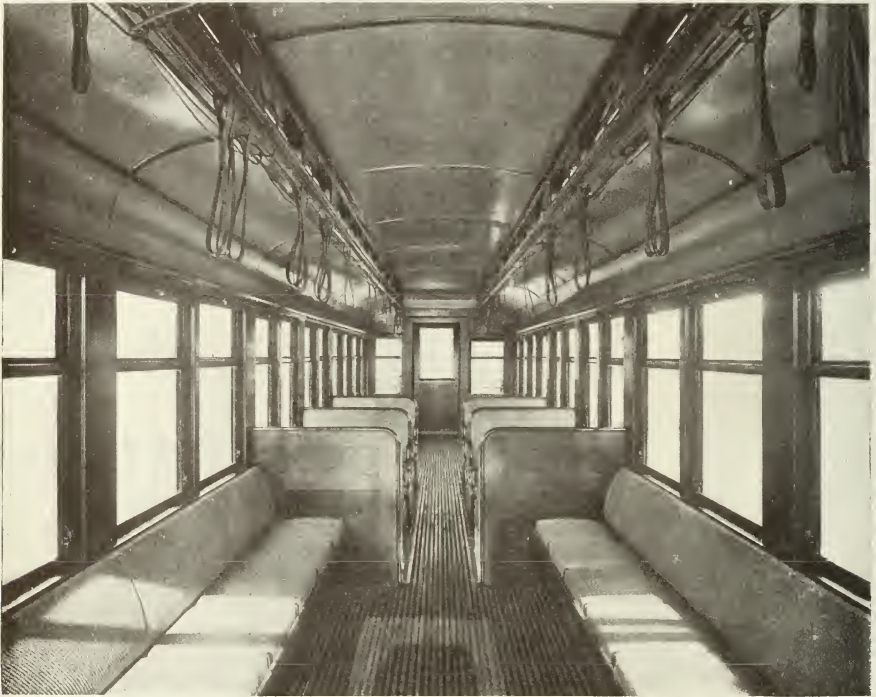


EQUIPMENT FOR THE INTERBOROUGH RAPID TRANSIT COMPANY

CARS FOR ELEVATED SERVICE

THE Wason Manufacturing Company was the builder of twenty cars recently delivered to the Interborough Rapid Transit Company for use on its Manhattan Elevated Division. The cars are of wooden construction, all timber used in the under-frame being long-leaf yellow pine, except the needle beams and end sills which are of white oak. The side sills, however, are reinforced on their inner faces by a 6 by ½-inch steel plate and the bolsters are made of two rolled-steel plates. Truss rods are employed both above and below each side sill. An interesting feature is the use of the Doyle steel side posts, which are secured to the sill and plate by bolts. The cars are also equipped with Hedley anti-climbers which are bumpers made from a rolled-steel section with corrugated face.

The Doyle steel post is pressed from No. 16 sheet steel, two pieces of steel being used for each post. A single piece is used for both sides and the front face of the post and the second piece is used for the back and is riveted to the front. The necessary sash stops are brazed on. Both the wide and narrow posts are of the same design with suitable



CARS FOR THE INTERBOROUGH RAPID TRANSIT COMPANY—The Steel on the Inside of the Cars is Painted and Grained in Imitation of the Natural Mahogany Finish Which is Used

side corrugations for the sash and curtains and have an extension plate fastened to the bottom for attaching them securely to the side sills.

The interior arrangement is that which seems to have been adopted as standard by most of the elevated railways, four transverse seats with stationary backs being placed in the center of the car and longitudinal seats provided for the balance of the length of the car body. The interior finish is natural mahogany including the end doors, which slide from right to left from the inside of the car in opening. The

headlining is Agosote and the wainscoating between the cross seats is sheet steel painted and grained in imitation of mahogany. The window sash are made of steel. The principal dimensions of the cars are as follows:

Length over end sills	39 ft. 8 in.
Length over bumpers	47 ft.
Width over side sills	8 ft. 6 in.
Height top of rail to top of roof	12 ft. 10½ in.



CARS FOR THE INTERBOROUGH RAPID TRANSIT COMPANY—Twenty Cars of the Above Type and the Trucks on Which They Are Mounted Were Built by the Wason Manufacturing Company for the Manhattan Elevated Division

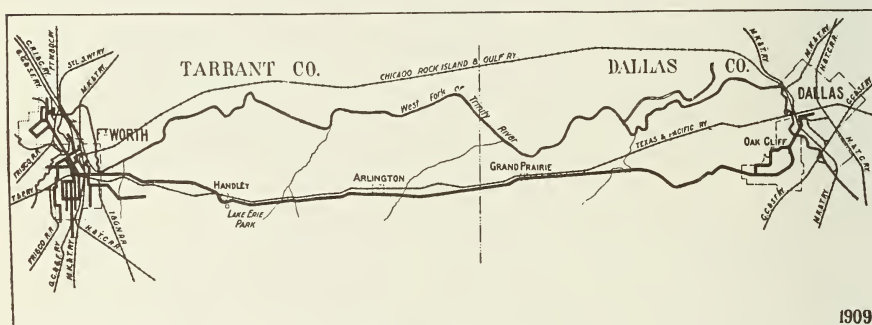
The cars are mounted on trail trucks of the built-up type and were constructed by the Wason Manufacturing Company, which also constructed on the same order sixty additional trucks of the same design. The frames of the trucks are wrought iron bars with reinforced corners. The pedestals are grey iron castings fitted to the frame and machined on the faces and sides for journal boxes. The transoms are wrought iron and the equalizing bars are made of open hearth steel cut from plates one-half inch thick and forged.



CARS FOR THE NORTHERN TEXAS TRACTION COMPANY

A STONE & WEBSTER PROPERTY

THE Northern Texas Traction Company operates an inter-urban electric railway between Fort Worth and Dallas, Texas, a distance of 33 miles, with an entrance over its own tracks to the center of the latter city. The company also operates an electric railway in Fort Worth. Under the management of Stone & Webster the property has shown a consistent growth and development and for the year ending December 31, 1909, the North-



CARS FOR THE NORTHERN TEXAS TRACTION COMPANY—Fort Worth and Dallas, Which the Company Serves Are Two of the Principal Cities of Texas and With the Rest of the Southwest Are Growing Rapidly

ern Texas Electric Company, which owns the capital stock of the Northern Texas Traction Company, reported gross earnings of \$1,259,550 and operating expenses of \$692,734 and a balance after deductions for interest charges and taxes of \$362,676, from which were paid dividends of six per cent. on the preferred stock and two per cent. on the common stock.

The Northern Texas Traction Company has recently received four full vestibuled single-end interurban cars for high speed service from the G. C. Kuhlman Car Company. The cars are arranged for multiple-unit operation in trains of two or more cars and each car has a passenger and smoking compartment. The dimensions of the cars

which closely approximate the generally accepted standard for inter-urban practice are as follows:

Length over end panels	40 ft. 0 in.
Length over front platform	5 ft. 0 in.
Length over rear platform	6 ft. 0 in.
Length over bumpers	52 ft. 0 in.
Width at sills over sheathing	8 ft. 10 in.
Height from top of rails to under side of sills	43 in.
Height top of rail to top of roof	13 ft. 0 in.

Each car seats 54 passengers, the smoking compartment seating 24 people and the regular coach compartment 30 people. The seats are all stationary and except for one rear seat opposite the saloon all the seats are placed transversely. The semi-empire type of ceiling is used



CARS FOR THE NORTHERN TEXAS TRACTION COMPANY—The Cars Are Equipped for Multiple-Unit Operation In Trains of Two or More Cars—The Cars Also Have Couplers at the Rear for Handling City Equipment

and the cars are finished throughout in mahogany with inlaid work of plain straight-line pattern in the principal panels.

The cars have the usual type of underframing which is used for interurban cars, with ample steel reinforcing. The steel member of each side sill is a 6-in. channel iron with a $3\frac{1}{2}$ by $7\frac{3}{4}$ -in. yellow pine outside and a $2\frac{1}{4}$ by 6-in. yellow pine inside filler. The intermediate sills are $4\frac{1}{2}$ by 6-in. pine reinforced from the bumper to a point 3 ft. beyond the bolster and plated on one side with 6 by $\frac{7}{8}$ -in. steel plate. The center sills are 6-in. I-beams weighing 14.25 lb. per foot and with suitable wood fillers. There are two needle beams made of 6-in. I-beams weighing 12.25 lb. per foot and frequent oak crossings. At each crossing $\frac{5}{8}$ -in. tie rods are used. The truss rods under the side sills are $1\frac{1}{4}$ in. in diameter. The body bolsters are built up from 10



CARS FOR THE NORTHERN TEXAS TRACTION COMPANY—The Interior Finish is Mahogany With Plain Inlay—The Semi-Empire Deck Has Composition Headlining

by $1\frac{1}{4}$ -in. steel and have a guaranteed carrying capacity of 75,000 lb. each.

It is interesting to note that the steps provided for the cars have the heights which were accepted at the 1908 convention of the American Street & Interurban Engineering Association as recommended practice. These heights are respectively:

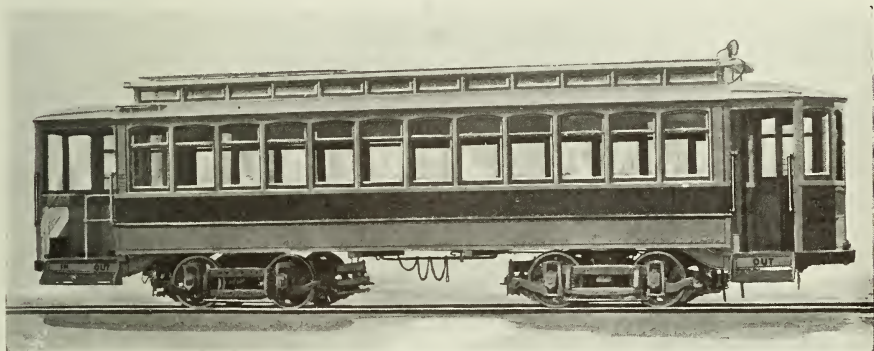
Height from top of rail to top of tread, first step	17 in.
Height from top of rail to top of tread, second step	29 in.
Height from top of rail to top of tread, third step	40 in.
Height from top of rail to vestibule floor	51 in.

Each car is equipped at the rear with a Van Dorn coupler which has its center 20-in. above the rail, thus permitting coupling with the city cars now in service, which have the recommended standard A. S. I. R. A. coupler height.

NEW EQUIPMENT FOR DETROIT

PREPAYMENT TYPE

DETROIT, which for some time past has had a distinctive type of car, has recently joined the list of cities operating Pay-As-You-Enter cars. It had previously been pointed out that cars with the so-called Detroit type of platform could readily be rebuilt for Pay-As-You-Enter operation and it has even been suggested that the Detroit platform furnished the designer of the first Pay-As-You-Enter car with his initial inspiration. The

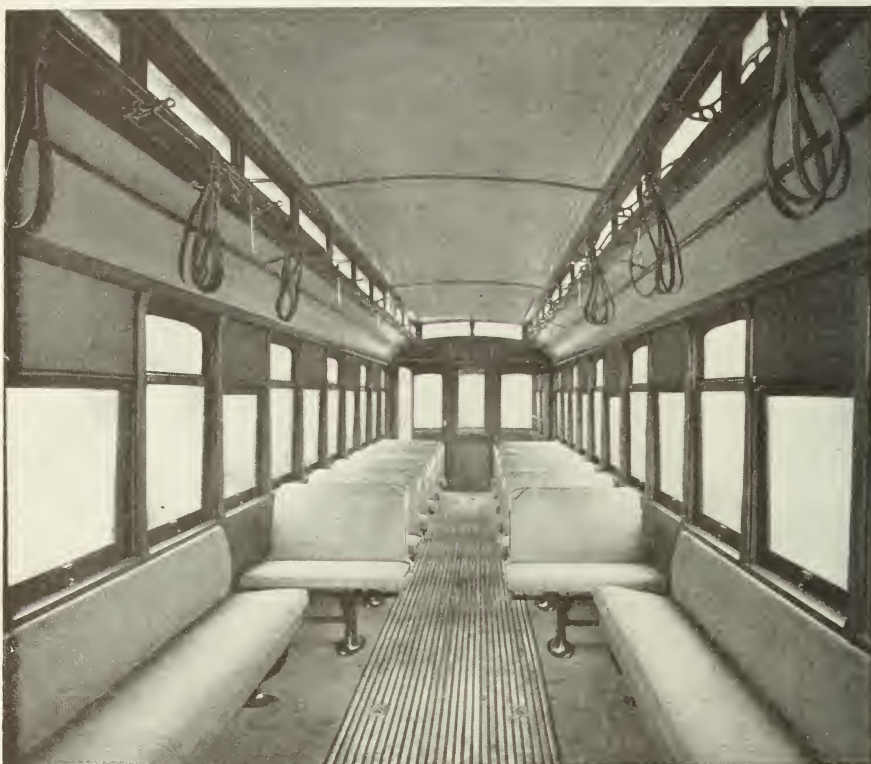


NEW EQUIPMENT FOR DETROIT—Single-End Pay-As-You-Enter Car Mounted on Brill No. 27-F Trucks, of Which 25 Have Recently Been Delivered by the G. C. Kuhlman Car Company

present order of the Detroit United Railways calls for 25 Pay-As-You-Enter cars, all of which have been delivered by the G. C. Kuhlman Car Company. In addition the Kuhlman Company is rebuilding 100 of the former type of Detroit cars and equipping them with Pay-As-You-Enter platforms.

The new cars are of the single-end type with a front platform 5 ft. 2 in. long over the bumper iron and a rear platform 5 ft. 10 in. long. The rear platform, which is standard with respect to the Pay-As-You-Enter feature, has a comparatively square end in order to provide maximum standing room. It is fully vestibuled and double sash are employed on the devil strip side, which are symmetrical with the other side sash. The end sash are single and are arranged to drop.

The front platform is 4 ft. 4 in. long inside and is octagonal in shape instead of round or elliptic as in case of the rear platform. The motorman is partitioned off from the front exit door by a paneled quartered oak partition which has a single inward opening swing door. A car

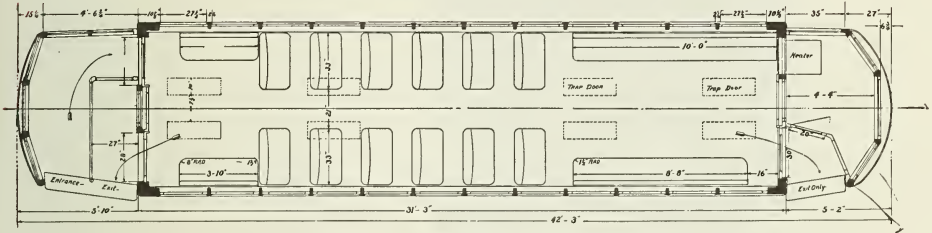


NEW EQUIPMENT FOR DETROIT—There Are Long Longitudinal Seats At the Front and Short Longitudinal Seats At the Rear—The Arrangement is Designed to Encourage the Use of the Front Exit

heater is installed in the motorman's cab. Instead of the sliding exit door in the side of the front vestibule—the usual Pay-As-You-Enter arrangement—the platform exit is entirely clear. The sliding door located on the step side of the front bulkhead is, however, operated by the motorman.

The seats have been carefully arranged to facilitate movement of passengers by inducing them to leave by the front exit. Longitudinal

seats occupying four windows each are placed at the front and practically all of the standing room is located at this point. There are ten transverse seats, five on each side and only short longitudinal seats at the rear, which are more or less incidental to the Pay-As-You-Enter arrangement of exit and entrance doors in the rear bulkhead.

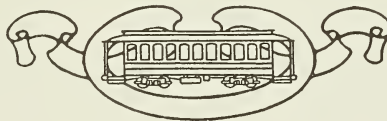


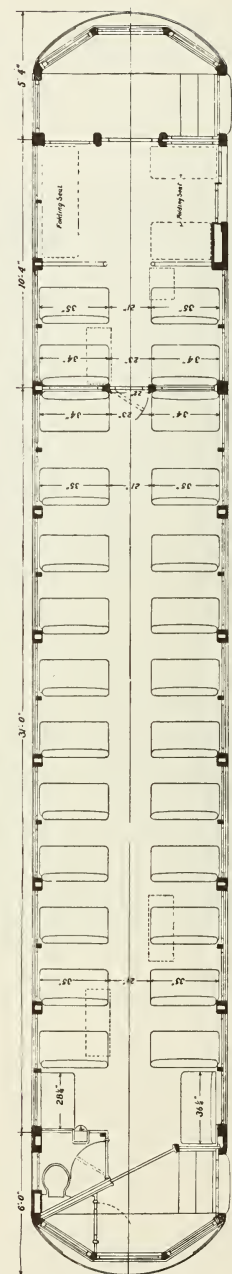
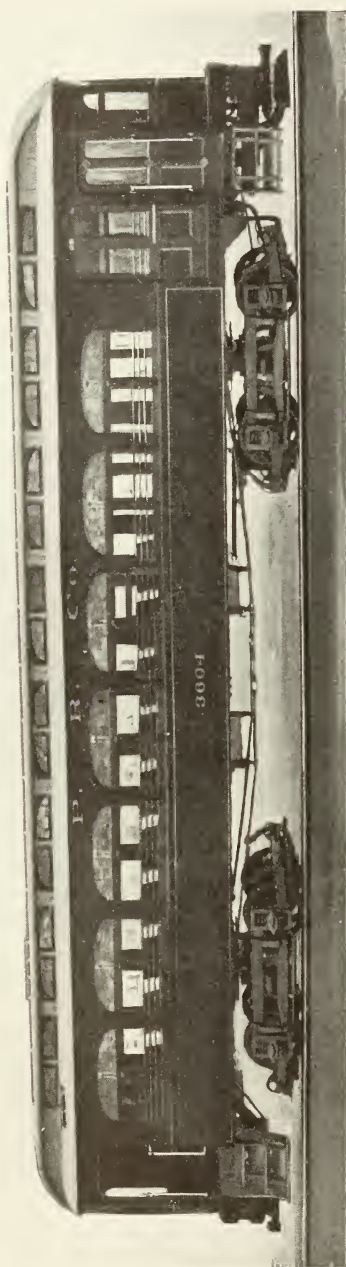
NEW EQUIPMENT FOR DETROIT—Both the Seating Arrangement and the Plan of the Front Platform Are Unusual and Are Possible Because the Cars Are of the Single-End Type

The following are the principal dimensions of the cars, which are mounted on Brill No. 27-F trucks:

Length over corner posts	31 ft. 3 in.
Length over bumpers	42 ft. 3 in.
Width over posts	8 ft. 3 1/2 in.
Height bottom of sill to top of roof	9 ft. 0-3/8 in.

The interior finish is natural quartered white oak. The headlining is bird's-eye maple veneer.





INTERURBAN EQUIPMENT FOR THE PITTSBURGH RAILWAYS—The Cars are of the Combination Passenger, Smoking and Baggage Type—The Plan of the Rear Platform and of the Baggage and Smoking Compartment Are Unusual—The Cars Are Mounted on Temporary Trucks for Photographing

INTERURBAN EQUIPMENT FOR THE PITTSBURG RAILWAYS

A KUHLMAN PRODUCT

THE twenty interurban cars which were recently delivered to the Pittsburg Railways Company by the G. C. Kuhlman Car Company are in some respects the handsomest cars for high speed service which have been built at the Cleveland plant for some time past. The accompanying engravings fail to do justice to them. The cars are of the combination baggage, smoking and passenger type and have the following dimensions:

Length over bumpers	52 ft. 8 in.
Length over vestibules	51 ft. 4 in.



INTERURBAN EQUIPMENT FOR THE PITTSBURG RAILWAYS—Interior View of the Smoking Compartment
Taken From the Baggage Compartment Which Has Folding Seats For Smokers
Use When No Baggage Is Carried

Length of passenger compartment	31 ft. 0 in.
Length of baggage and smoking compartment	10 ft. 4 in.
Height from rail to bottom of sills	3 ft. 4 in.
Height from rail over trolley board	12 ft. 10 in.
Width over sheathing at belt	8 ft. 4 in.
Distance between truck centers	27 ft. 6 in.

The cars are of the single end type and have the combined baggage and smoking compartment of each car located immediately back of the



INTERURBAN EQUIPMENT FOR THE PITTSBURG RAILWAYS—The Cars Have Cherry Finish With Inlay and Full Empire Ceilings—The Seats in the Passenger Compartment Are Upholstered In Plush and in the Smoking Compartment in Imitation Leather

front vestibule. Half of the compartment is partitioned off by a solid wood partition about 42 in. high. The partition is bordered at the top with brass pipe and is reinforced by brass pipe stanchions. In the baggage section of the compartment there are three folding wood slat seats arranged to drop. One of them is a longitudinal seat along the

left hand side of the car and the other two are transverse seats against the front bulkhead and the compartment partition. When the compartment is used for baggage the three seats are folded down. Baggage is handled through a 38-in. two-section door which slides towards the rear of the car. The windows and doors are protected from injury by iron rods and the baggage door heads are protected on both sides by heavy sheet iron.

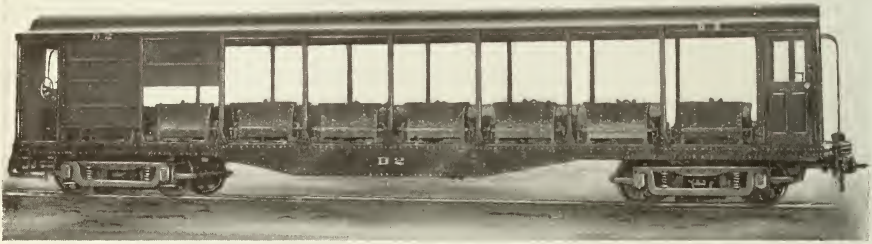
The cars throughout have mahoganyed cherry interior finish with plain line inlay. The seats in the smoking compartment, except the folding wood slat seats already referred to, are upholstered in imitation leather. The passenger compartment seats are upholstered in plush and like the reversible seats in the smoking compartment have a head roll. All the seats are 35 in. long and 25 in. high. The ceilings are of the full empire style.

The rear vestibule of the cars is somewhat unusual in arrangement, as will be noted from an examination of the accompanying floor plan. By the use of a diagonal partition extending from the left hand corner post of the car to the right hand center door post, room is provided for a platform locker and for a toilet room. This arrangement increases seating capacity by at least three seats and the location of the toilet room outside of the wheel base of the cars has manifest advantages.

The arrangement of both the rear platform and the combined smoking and baggage compartment are in the line of economy of space which has been referred to from time to time in Brill Magazine in connection with interurban equipment. This economy of space however appears to be in most every case for the purpose of increasing seating capacity instead of for the purpose of reducing the total weight. Yet it accomplishes a reduction in the weight per seated passenger, which we believe should be as eagerly sought by managers of interurban properties as by the managers of city lines. Interurban cars, to be sure, must have a certain degree of weight to fit them for high speed service, but there are indications, such as European steam railway practice and the experience of managers of city electric railway lines in America, to indicate that economy in interurban car weight is advisable, possible and has a certain future.

TWO ALL-STEEL BAGGAGE CARS FOR SUBWAY SERVICE

THE Hudson & Manhattan Railroad Company recently received from The J. G. Brill Company two all-steel cars specially designed for transportation of baggage between the several steam railway terminals which are served by the Hudson tunnel lines. Each car is arranged to receive at one time eight loaded baggage trucks, the plan of the design being that the baggage should be transported on the trucks in order to eliminate all

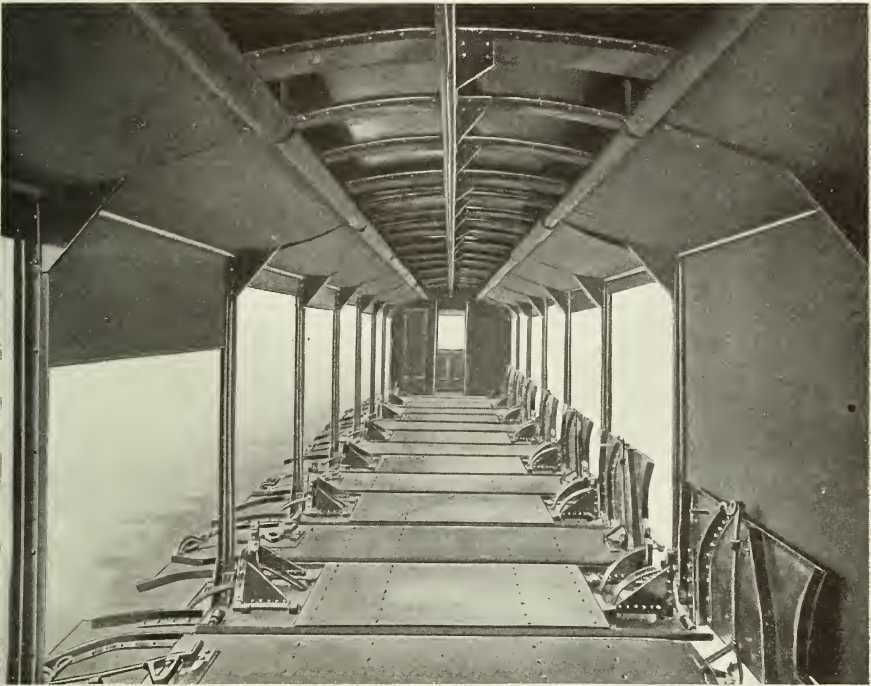


TWO ALL-STEEL BAGGAGE CARS—Between Each Pair of Posts is a Folding Apron Which When Raised Will Lock a Loaded Baggage Truck in Position on the Car

extra handling and trucking and to make it possible to unload a car with minimum delay. For this purpose each of the eight spaces between side posts is provided with a folding apron on which are runways or guides, formed from steel plate, for the truck wheels. The runways on the apron are in line with depressions in the sheet steel floor of the car and thus a continuous guide or track for the truck wheels is provided by which a truck loaded with baggage may be pushed into position on the car from the platform on which it is standing. The aprons which take the place of the loose steel plate frequently used by freight and baggage handlers to bridge the gap between loading platform and car, are cleverly designed with levers and locking devices. The aprons themselves are part of a locking device for holding the baggage trucks on the car and are equipped with bolts

which are interlocked in the train line pressure so that the brakes are kept set until the aprons are raised.

The locking device for holding the baggage trucks on the car consists of the apron, two guide levers and two swinging hooks at each end of each truck compartment. The guide levers act upon the swinging hooks in such a manner that when the apron is raised, the



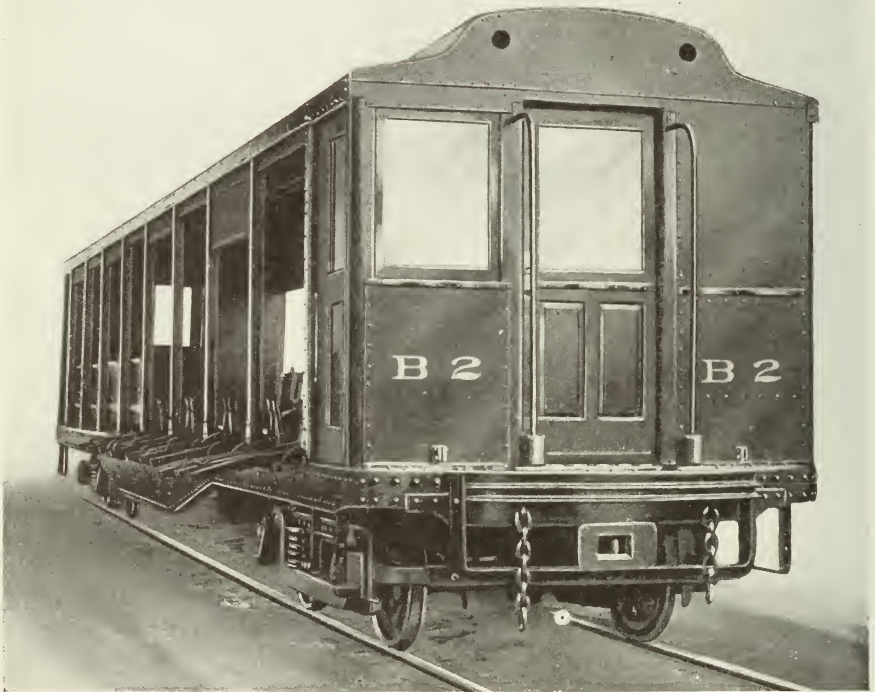
TWO ALL-STEEL BAGGAGE CARS—When Lowered the Folding Aprons Form Both a Support and a Track By Which the Baggage Cars May Be Pushed Upon the Car From the Platform

levers at either end force the swing hooks together and clamp the baggage trucks and secure them against any motion of the moving car.

The locking device for the platform aprons consists of a central handle with a bar extended to the flooring and having a foot and a hook formed at the end to brace the apron in the vertical position when the handle is turned. The handle hooks over the top of the apron plate in the upright position. The bottom end of this bar with the bracing foot and hook is also attached and hinged to a stem extend-

ing through the floor and braced by side sill clips. This stem is fitted through sockets to a valve stem which turns the valve in the train line open or closed and thus holds the brakes set whenever the aprons are lowered.

The sides of the cars are enclosed by waterproof curtains which fit between each pair of side posts and extend from the side deck plate to

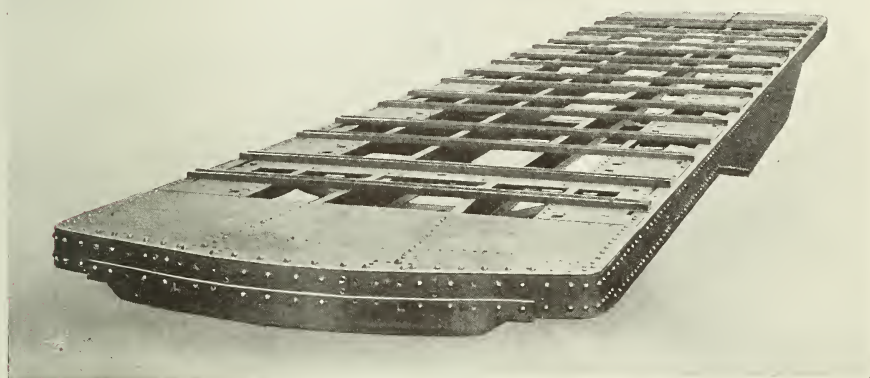


TWO ALL-STEEL BAGGAGE CARS—The Cars Were Built By The J. G. Brill Company and Conform In Design to the Standard Equipment of the Hudson and Manhattan Railroad

the floor. The posts are provided on each side with angles which, with flanges of the T-sections from which the posts are made, form guides for the curtains. There is a motorman's compartment at both ends of the cars.

The underframing of the cars comprises side sills of the fish-belly type 22 in. deep at the center and 9 in. deep over trucks. Each side sill is built up of $3\frac{1}{2}$ by 3 by $\frac{7}{16}$ -in. rolled steel angles for top and

bottom members, united by a $\frac{5}{16}$ -in. plate. The center sills are 8-in. rolled steel channels (11.25 lb.) braced at intervals to insure against buffing strains. These sills are reinforced at the bolsters where the top flange is cut away by a 7-in. steel channel. The end sills are built up of $3\frac{1}{2}$ by $3\frac{1}{2}$ by $\frac{7}{16}$ -in. rolled steel angles with $\frac{1}{2}$ -in. front plates and secured to the $\frac{1}{4}$ -in. anti-telescoping floor plate. The bottom part of the end sill is also reinforced by a $\frac{1}{2}$ -in. pressed plate which forms a guide and support for the drawbar. There are two cross beams between the bolsters which are built up of 6-in. steel channels. They are fastened to the side sills by strong knees and supported and braced to the



TWO ALL-STEEL BAGGAGE CARS—The Underframe Is Built Entirely From Structural Parts—The Channel Crossings Form the Tracks for the Baggage Truck Wheels

center sills with $\frac{1}{4}$ -in. gusset plates. The body bolsters consist of 9 by $\frac{3}{4}$ -in. wrought iron top members and 9 by 1-in. bottom members connected to the side sills through malleable iron fillers. The bolsters center filler is a steel casting.

The body framing comprises the T-section side posts referred to above which are $3\frac{1}{2}$ by 3 in. and weigh 8 lb. per foot. They are fastened to the side sills by $\frac{1}{4}$ -in. outside gusset plates and through the $\frac{1}{8}$ -in. floor plates by pressed pockets. The roof framing is built up from the side posts and $\frac{1}{4}$ -in. pressed angle section to which the side posts carlines and roof sheets are secured. The carlines bent to conform to the contour of the roof are $3\frac{1}{2}$ by 3-in. rolled T-sections in line with each pair of side posts and two $1\frac{1}{2}$ by $1\frac{1}{2}$ by $\frac{5}{16}$ -in. rolled

angle carlines between each T-section. The T-sections are strongly braced to the T-posts by double gussets. The roof is $\frac{1}{16}$ -in. leaded steel plates riveted to the roof framing and made water-tight by soldering.

The following are a few of the principal dimensions of the cars:

Length over platform end sills	49 ft. 7 in.
Length over anti-chambers (bumpers)	50 ft. 7 in.
Distance between truck centers	34 ft. 6 in.
Width over side sills	8 ft. $6\frac{3}{4}$ in.
Height from top of rail to top of flooring	3 ft. $9\frac{7}{8}$ in.
Height from top of rail to top of roof	11 ft. $8\frac{7}{16}$ in.

The specifications and design of the cars was prepared under the direction of Mr. L. B. Stillwell, consulting engineer of the Hudson & Manhattan Railroad Company.

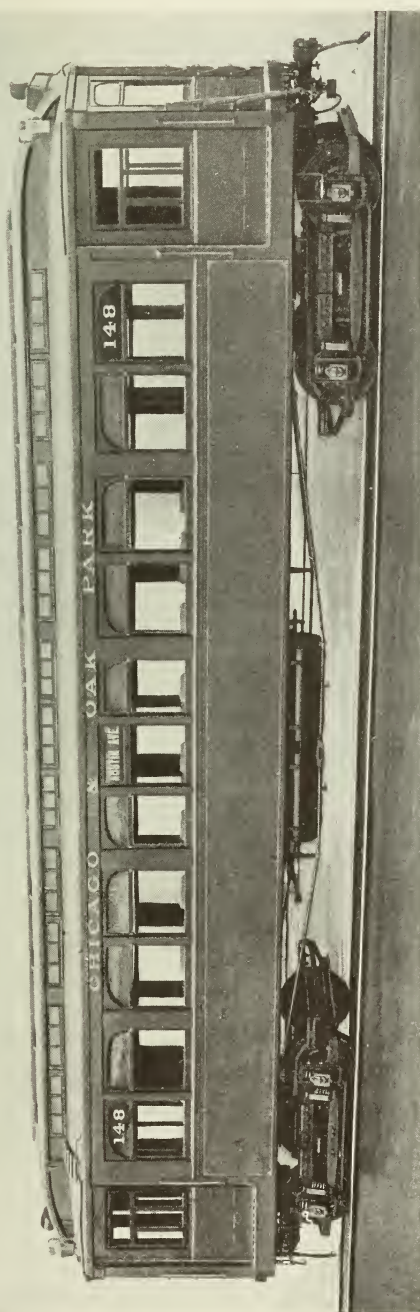


CARS FOR ELEVATED SERVICE IN CHICAGO

STRUCTURAL STEEL UNDERFRAME EQUIPMENT

TWENTY cars with end side-entrance doors and structural steel underframes have recently been completed by The J. G. Brill Company for the Chicago & Oak Park Elevated Railroad. In the arrangement of the sliding side doors at the ends of the cars and the general seating plan the cars are similar to those which until recently have been the standard type for New York subway service. In the use of the steel underframe instead of all-steel construction and reversible transverse seats at the center of the car instead of fixed seats and in similar features there is a variation which makes the two types of equipment comparable only in a general way.

The steel underframes of the Chicago & Oak Park cars are entirely structural. The side sills are 8-in. channels (16.25 lb.) and have a 3 by 3 by $\frac{3}{8}$ -in. angle riveted on the back at the bottom flange between corner posts. The side sills are reinforced below the car body with a



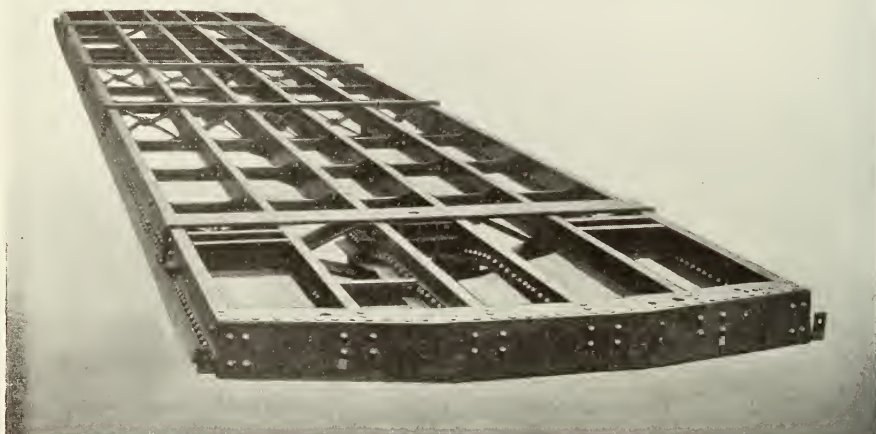
CAR FOR ELEVATED SERVICE IN CHICAGO—Mounted on Temporary Trucks—The Car Has a Steel Underframe and is 47 Feet Long Over End Plates

steel truss rod $1\frac{1}{2}$ in. in diameter and supported by two malleable iron truss posts 16 in. deep from bottom of side sill to center of rod. The four intermediate sills are channels extending the full length of the car and continuous through body bolster and needle beams and fastened to end sills channel and plates with riveted connections. The channel each side of the center line of the car is 8 in. deep (11.25 lb.) and the channels next to the side sills are 6 in. deep (10.5).

The cross members are 3-in. channels (4.0 lb.) and are spaced about 48 in. center to center. The end sills are formed of a bent 8-in. channel (11.25 lb.) with flanges turned in, mitered with the ends of the side sill channels and fastened to them with bent plate riveted connection. An oak buffer timber 6 in. thick is bolted to the end sill channels. The

body bolsters are made of two soft steel plates, the top $9 \times \frac{3}{4}$ in. and the bottom $9 \times \frac{7}{8}$ -in. secured to the intermediate sills by means of lugs and braces. A cast steel filler is used at the center between the two central longitudinal sills. There are two needle beams of similar construction to the body bolster, but with a $3 \times \frac{5}{8}$ -in. top plate and a $3 \times \frac{1}{2}$ -in. bar steel bottom plate.

The end posts over the end sills are reinforced with $3 \times 3 \times \frac{1}{2}$ -



CARS FOR ELEVATED SERVICE IN CHICAGO—This Underframe Like the One For the Hudson & Manhattan Cars is of the Structural Type But the Two Are Decidedly Different in Design

in. angles. These posts are connected at the top by a $3 \times 2 \times \frac{3}{8}$ -in. angle which is bent to the proper form and continues back across the sliding door opening. The portal posts at each side of the car at the end of the side seats are formed of two angles $3 \times 3 \times \frac{1}{4}$ -in. with $\frac{1}{4}$ -in. stay plates riveted at intervals between top and bottom. The posts are rigidly connected to the underframe with riveted connections to the side sills. At the top, forming the portal arch, there is a $5\frac{3}{4} \times \frac{1}{2}$ -in. plate fastened to the top of each side post. The posts on each side of the car between the corner posts, of which there are six compound or panel posts and six single posts, are wood.

The sliding end side-doors for entrance and exit are four in number and are located two at each end of the car. They recede into pockets provided on either side and are pneumatically operated.

There is an end door in each end of the car to permit of uninterrupted passage from one car to another and located in the framing so as to afford ample space for a trainman to stand and operate simultaneously the sliding doors of adjacent cars. These doors have a sliding sash in



CARS FOR ELEVATED SERVICE IN CHICAGO—Built for Multiple Unit Operation and As Either Trail or Motor Cars

the upper panel, with brass guides and stops, to permit communication with the interior of the car and ventilation. A swinging sash door is provided in each vestibule which closes against the sliding door post and encloses the electrical and air brake control apparatus. In three of the portal posts at the car ends, compartments are built for housing the electrical apparatus and in one post there is a compartment containing the conductor's locker. The

three compartments containing electrical apparatus are lined with $\frac{1}{4}$ -in. Transite cemented to the wood-work.

The inside finish of the cars is high grade Mexican mahogany of selected color and put on with oxidized brass screws. The headlining is of three-ply material with the outer ply of selected white maple. There are seven cross seats in the center of each car and longitudinal seats on each side between the cross seats and the ends of the car body.

Each car is wired and equipped complete with seven circuits of five lights each. Four of these circuits are 16-candle power 110-volt lamps located in the molding or strip over the advertising card space



CARS FOR ELEVATED SERVICE IN CHICAGO—The Interior Finish is Mahogany—Each Car is Lighted by Four Circuits of Five 15 Candlepower Lamps and One Circuit of Five 32 Candlepower Lamps—There Are 28 Electric Heaters in Each Car

and one circuit of five 32-candle power lamps is used for ceiling lights. Two circuits furnish lights for the markers and destination signs at each end of the car. Each car is equipped with 28 electric heaters, arranged 12 on each side along the baseboard and two in each vestibule located on each side of the end door. This equipment as will be readily seen gives the cars a remarkably fine lighting and heating equipment with which a most exacting public could not find cause for complaint.

The cars have the following dimensions:

Length over end plates	47 ft. 4 $\frac{3}{4}$ in.
Width over side sheathing	8 ft. 6 in.
Width over eaves (extreme)	8 ft. 8 $\frac{3}{4}$ in.
Width over sliding door opening	3 ft. 10 in.
Width of portal opening	6 ft. 8 in.
Distance between truck centers	33 ft. 8 in.
Truck wheel base	6 ft. 0 in.



CARS FOR ELEVATED SERVICE IN CHICAGO—The Portal Posts Contain Compartments for Electrical Apparatus—The Folding Door Encloses the Control Equipment or Forms a Motorman's Cab

Figures are not available to show the weight of the motors and electrical equipment, but the following items of weight will doubtless be of interest:

Steel underframe	8,080 lb.
Body including air brakes, heaters, couplers	33,120 "
Trucks	21,960 "
<hr/>	
Total car body and trucks less electrical equipment	63,160 lb.

The trucks which have cast steel side frames and are the standard type of the Chicago & Oak Park Railroad were built by a Chicago company.



SINGLE-END PAY-AS-YOU-ENTER CARS EQUIPMENT FOR TOPEKA, KANSAS

SEVERAL months ago there were delivered to the Topeka (Kan.) Railway Company, 12 Pay-As-You-Enter cars, built by the American Car Company. The cars are of the single-end type and accordingly are in many respects comparable with the cars for Detroit which are described on another page. The Topeka cars are of approximately the same length—28 ft. 8 in. over end panels—and have a short front platform and a long rear platform.



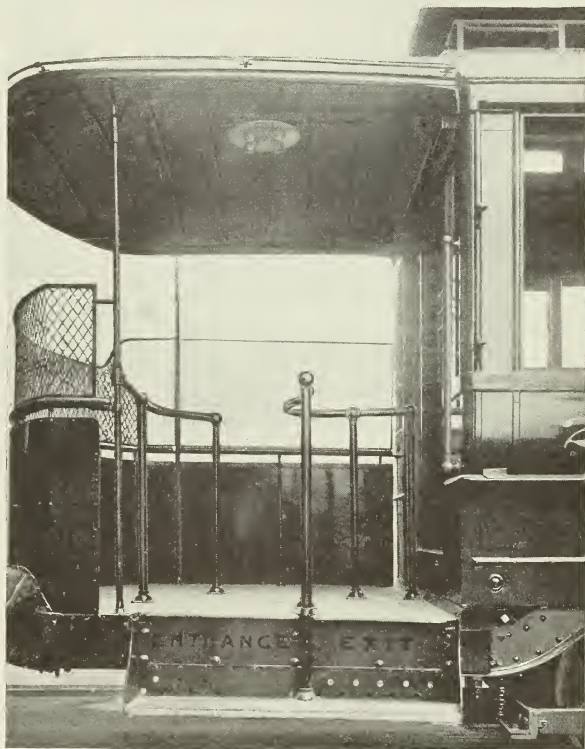
SINGLE-END PAY-AS-YOU-ENTER CAR—Mounted on Brill No. 27-G1 Trucks for Service in Topeka, Kansas—Twelve Cars of this Type Were Delivered by the American Car Company

One of the distinctive features is the arrangement for allowing smokers to stand on the rear platform, a practice which has been somewhat questioned. The platform is seven feet long and has a step opening on the right hand side only. A dasher made of $\frac{1}{16}$ -in. steel extends from the left side around the end to the pipe stanchion which supports the platform hood and is located at the left of the step opening. Above the dasher is a woven wire screen guard. The platform in addition to the usual iron rail used in connection with the Pay-As-You-Enter feature has a second pipe railing extending one-third of the way around the platform from the pipe stanchion at the steps. Smokers are allowed to stand behind this rail. It will be noted that the railing arrangement is such that each passenger must pass the conductor before it is possible for him to take a place back of the rail.

The front platform is four feet long and instead of the usual sliding doors has a two section folding door each leaf of which opens outwardly and is controlled by the motorman. The front bulkhead door like the corresponding door in the Detroit cars is placed at the right hand side near the step exit and is of the sliding type. It is however designed for operation by the passengers. There is also similarity between the Topeka and Detroit cars in that a heater is placed on the front platform. The Topeka cars however have no motorman's compartment partition but instead a pipe railing is used.

The interior finish of the cars is light cherry and the transverse seats which are used are of Brill

manufacture. The seating arrangement provides for longitudinal seats at the rear occupying two windows on each side and for eight transverse seats on the left hand side and six on the right. There is a short longitudinal seat at the front near the exit. The ceilings are of Agosote which is painted green. The framing of the cars is of the usual type with $4\frac{3}{4}$ by $7\frac{3}{4}$ -in. long leaf yellow pine side sills which are plated with 15 by $\frac{3}{8}$ -in. steel plates. The end sills are $4\frac{1}{4}$ by $6\frac{7}{8}$ -in. white oak and the other crossings are also of white oak but somewhat smaller in size.



SINGLE-END PAY-AS-YOU-ENTER CARS—The Rear Platform is Seven Feet long and is Arranged to Accomodate Smokers

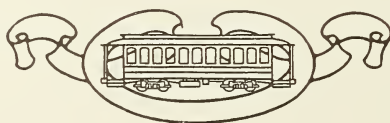


SINGLE-END PAY-AS-YOU-ENTER CARS—Each of the Rear Doors is of the Two-Panel Telescoping Type

The following are the principal dimensions of the cars:

Length over end panels	28 ft. 8 in.
Length over platform sheathing	39 ft. 8 in.
Width at sills	7 ft. 9 in.
Width over posts above belt	8 ft. 2 in.

The cars are mounted on Brill No. 27-G1 trucks and among the special equipment are Brill sand boxes.



BRILL MAGAZINE

Published on the fifteenth
of each month by the

**PUBLICITY DEPARTMENT OF
THE J. G. BRILL COMPANY**

In the interests of The J. G. Brill Company, American Car Company, John Stephenson Company, G. C. Kuhlman Car Company, Wason Manufacturing Company, Danville Car Company.



THE editor of Brill Magazine wishes to take this opportunity to correct an error appearing in Brill Magazine of December, 1909, which has been brought to our attention by Mr. John W. Corning, secretary, The American Street and Interurban Railway Engineering Association. In the article on Standard Motor Axles, certain specifications for steel axles were presented and it was stated that those specifications had been adopted at the Denver Convention of The American Street and Interurban Railway Association; whereas, the facts are that the specifications were recommended by the Committee on Standards, but could not be adopted for the reason that they had not previously been presented to the Association for consideration.

In the recommended specifications for steel axles as published in Brill Magazine, the first of paragraph (4) Tests, reading as follows was omitted:

4. Tests: One test per melt will be required, the test specimen to be taken from either end of any axles or from full sized prolongations of same with a hollow drill half way between the centre and the outside parallel to the axis of the axle.



EUROPEAN railway managers seem to be agreed that for the average European city a car is impractical which is as long as the 28-to 30-ft. car in service in most American cities. The principal reason for the general use of a short car seems to be that the requirements in connection with tickets for the zone system of fare collection and the large number of short haul passengers makes it impossible for one man to do efficient work if a larger car is used. The alternative of placing two conductors on each car has apparently been considered, but thus far the scheme has taken the form of a trail car operation. Of late there has been more or less interest manifested abroad in the Pay-As-You-Enter car, which at first glance would seem to be a possible solution of the problem, but the interest has not reached the stage that has resulted in the adoption of the Pay-As-You-Enter car for even experimental purposes, nor has it surmounted the obstacles of zone fare collection as applied to that type of car. Fortunately for American managers, the problems of zone operation

have not arisen in connection with the adoption of the Pay-As-You-Enter plan, but they are not beyond the range of possibility.



IT is refreshing to find in the cars for the Northern Texas Traction Company, which are described on another page, some evidence of an effort to adopt recommended standards of the American Street & Interurban Railway Association other than those which will bring immediate benefits of a financial sort. Since the Engineering Association first took up the work of standardization of equipment, there have been decided results as far as wheels and brake shoes are concerned and, of late, with reference to axles. But it seems to be agreed that the success in securing standardization of these parts by many electric railways has been due largely to the effective manner in which the manufacturer has been able to show the actual saving which standardization secures to the consumer in dollars and cents. It is impossible to show in the same way direct benefits by the standardization of step heights, coupler heights and bumper heights; but were all electric railways to simultaneously adopt standard dimensions for these and other features, there would most assuredly be a saving in the cost of production which would not be without its reward to the user of the equipment. Such an organization

as the Stone & Webster Engineering Corporation, which prepared the specifications for the Northern Texas cars, has a particularly fine opportunity to effect a large saving by the application of standards of equipment to apply to all the lines under their supervision and by force of example and influence to further the work of standardization throughout the country.



BRILL MAGAZINE is evidence that The J. G. Brill Company and allied companies are thorough believers in advertising. Nor is there an entire lack of evidence to the same effect in other places. We are equally strong believers in advertising for electric railways and there is an increasing indication that the management of many electric railways believes likewise. One of the best opportunities to do effective advertising which presents itself to any electric railway is at the time new equipment is placed in service. There is then some tangible evidence to offer to the public that the service is being improved and that the sole purpose of the transportation corporation is not the creation of dividends. To be of assistance in this direction the Publicity Department of The J. G. Brill Company will furnish to any purchaser of Brill equipment, photographs and, if necessary, a description of the cars prepared for newspaper publication.

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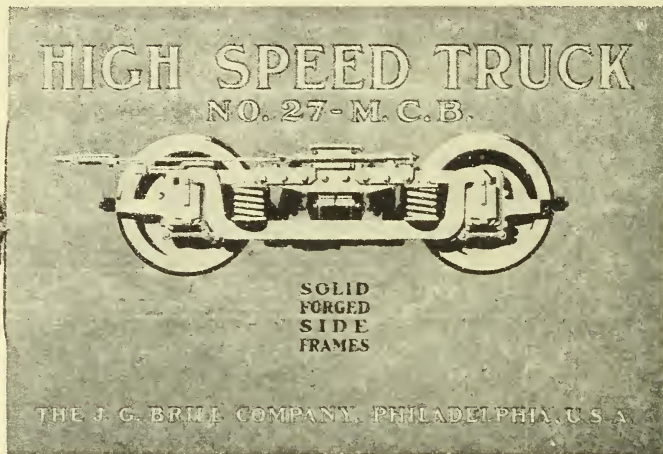
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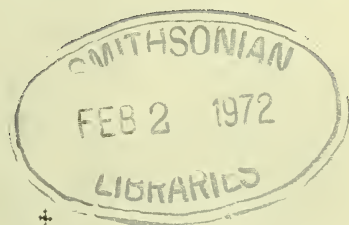


A NEW PAMPHLET CATALOGUE

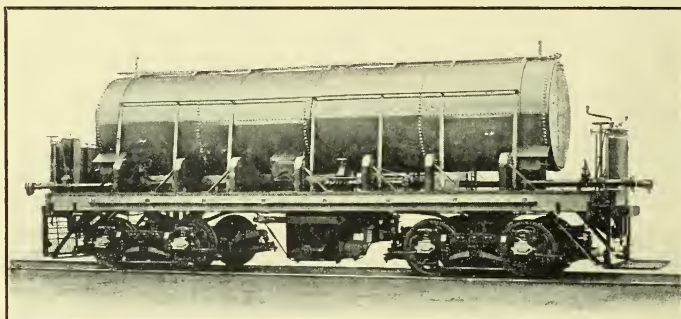
Every electric railway official interested in rolling stock for high speed electric railways should have a copy of the catalogue shown above which describes the only truck, built in accordance with M. C. B. principles, which has each side frame solid forged in a single piece. The solid forged frames are only one of the features of the truck. The catalogue tells of many others. Write the Publicity Department for a copy.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE



Temple of the Savior
Moscow, Russia.



BRILL CENTRIFUGAL SPRINKLING CAR

A little investigation will show you that it costs your municipality at least 60 cents per mile sprinkling by the horse and cart method now in vogue. With a Brill Centrifugal Sprinkler electric railways have given the same service, with less disturbance to traffic at a cost of 26 cents per mile including current consumption, employees' wages, interest on investment and depreciation. If you secured a contract at 40 cents per mile for 100 miles of street to be sprinkled twice a day for 6 months your net profit would be over \$5,000 a year, to say nothing of reduced wear and tear on your rolling stock and the increased comfort of your patrons.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



John J. Staulrey

BRILL MAGAZINE

Vol. IV

APRIL, 1910

No. 4

JOHN J. STANLEY

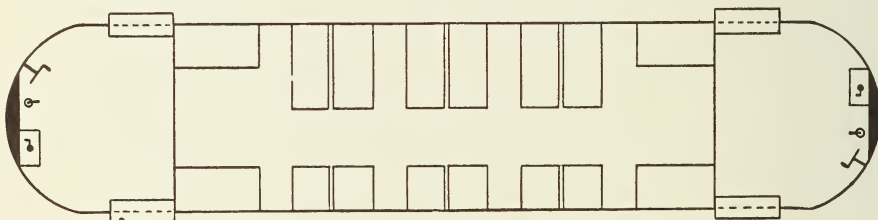
[WITH PORTRAIT INSERT]

JOHN J. STANLEY, the newly elected president of the Cleveland Railway Company was born in Cleveland in 1863 and received his education in that city. His father, Joseph Stanley, was the principal owner of the Broadway & Newburgh Railway Company, originally a horse car line. Just previous to the time the line was electrified Mr. Stanley took a position under his father and in 1878 was made superintendent. In 1892 there was a consolidation of the Broadway & Newburgh and the East Cleveland Railway companies under the name of the Cleveland Electric Railway and a year later the Brooklyn & South Side Railway was absorbed and at that time Mr. Stanley became general manager of the consolidated properties. In 1903 the consolidated properties were joined with the Cleveland City Railway, making what has been known as the "Big Consolidated", of which Mr. Stanley became vice-president and general manager. He held that position and made the Cleveland Electric Railway known throughout the country as one of the best operated electric railway properties in the United States, until April, 1908, when it was taken over by the Municipal Traction Company following a political upheaval. After six months under the new management a receiver was appointed, who served for sixteen months. At the end of that time a new franchise was granted to the Cleveland Railway Company, which took over the property on March 1, 1910, Mr. Stanley again becoming vice-president and general manager. Mr. Stanley is also interested with the Andrews-Vanderbilt Syndicate in the street railway and interurban properties at Utica, Herkimer, Oneida, Schenectady and Rochester, N. Y., known as the New York State Railways, of which he was until recently vice-president, a position which he resigned to devote his entire attention to the reorganization of the Cleveland property.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

MOSCOW, RUSSIA*

THERE are two tramway systems in Moscow. The Municipal Electric Tramways have about 50 miles of double track line and the Belgian Tramway Company have 26 miles of horse tramway. In addition there is a short section of municipally operated horse tramway and the Belgian Company has a short steam line which connects with an electric railway which it owns. A project is on foot for the electrification of the horse lines under municipal ownership and for the extension of the existing electric lines.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Seating Arrangement of the Moscow Trail and Motor Cars is Like That Shown Above and is Necessary Owing to Restricted Width Which is Seven Feet

For this purpose the municipality proposes to borrow 9,000,000 roubles (about \$4,750,000). It is expected that the work will also result in the electrification of the lines of the Belgian Company.

Under the existing organization, there is a wide variety in the rolling stock which is used, but in view of the predominance of the mileage of municipal electric tramways and the consequent predominance numerically of the electrically operated cars, the standard electric cars of the municipal tramways may safely be considered the present

* This is the sixteenth of a series of articles, commencing in the January 1909 number of Brill Magazine, which describe in a general way the type of car in many of the larger cities of the world, with information indicating the conditions which have been the influencing factors in the adoption of the several types. The cities considered in previous articles have been in order of the appearance of the articles: Philadelphia, New York, Detroit, Chicago, Baltimore, London, Washington, New Orleans, Boston, Denver, Atlanta, Portland, (Ore.) Norfolk, Lisbon, Portugal and Milan, Italy.

standard of Moscow. While the various types are all of considerable interest no attempt will be made in this article to show the influence which they have had on the present standard car of the electric rail-



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Total Mileage of the Various Tramway Systems in Moscow is 76 Miles of Double Track—The Complete Electrification of the Municipal Tramways at an Early Date is Probable

ways or to describe cars other than those used in electric service. There are two types of standard cars, a motor car and a trail car, both of practically the same dimensions. The following are the principal

dimensions of the motor car and figures for the weight of car body and equipment:

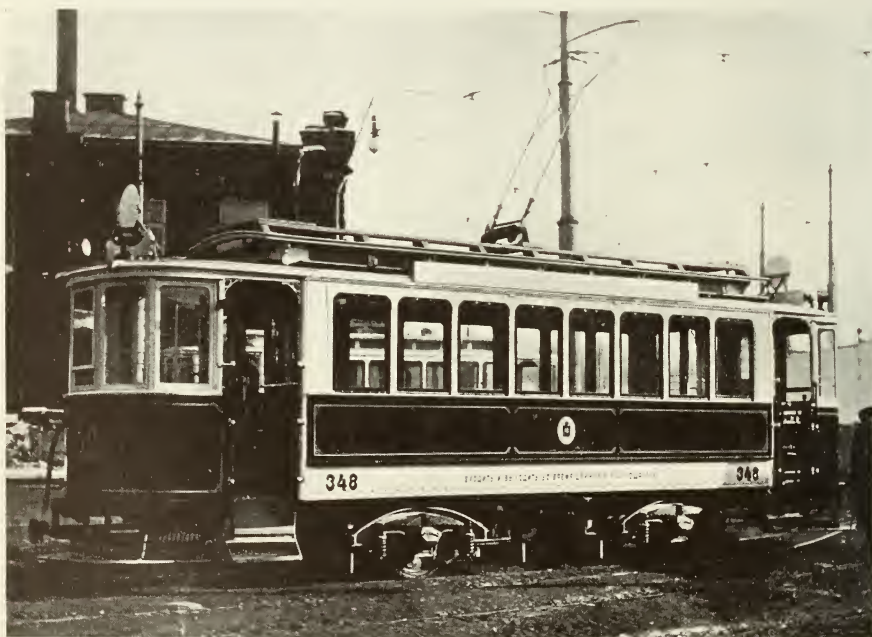
Length over bumpers	34 ft. 1 in.
Length over end panels	21 ft. 8 in.
Extreme width	7 ft. 1 in.
Height top of rail to top of trolley board	11 ft. 2 in.
Diameter of wheels	33½ in.
Journal dimensions	3½ in. x 7 in.

Weight:

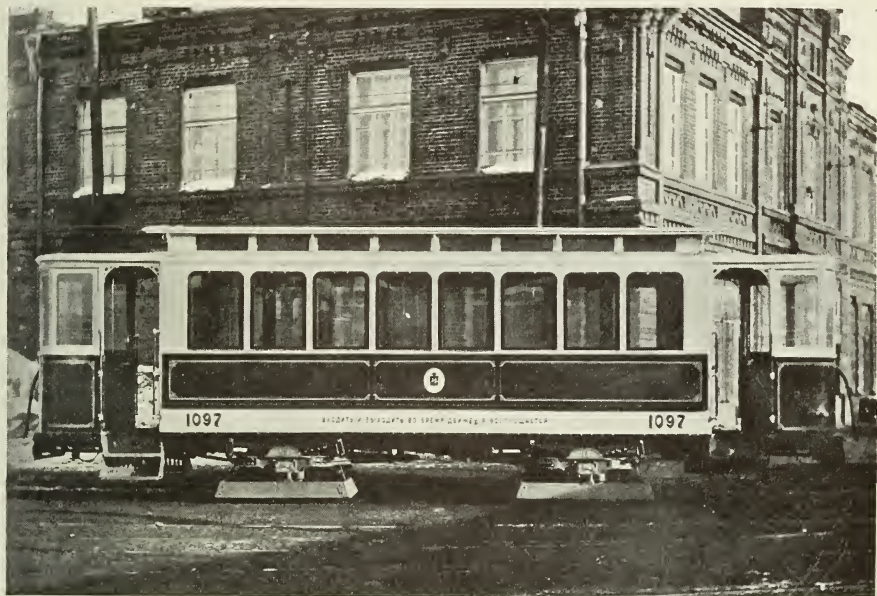
Carbody and apparatus	20,500 lb.
Trucks and motors (2)	8,500 lb.

Total 29,000 lb.

The trail car bodies weigh 18,500 lb. each and are mounted on one-axle trucks of German manufacture as are the motor cars, which have two 50 h. p. motors per car. Both motor and trail cars are of the double-end type and have three-quarter vestibuled platforms which are



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Standard Motor Car of Moscow, Russia—Length Over Bumpers 34 ft.—The Total Weight With Two-Motor Equipment is 29,000 lb.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Standard Trail Car of the Moscow Tramways, Electric Section—Mounted on One Axle Trucks

about 6 ft. 6 in. long. The front platform of the motor cars is reserved entirely for the use of the motorman and passengers are not allowed to utilize it for standing room. The seating arrangement, which is somewhat unusual, as will be noted from the accompanying plan, is largely the result of the comparative narrowness (7 ft. 1 in.) of the car body, but seats are provided for 26 persons and 9 passengers are allowed to stand on the rear platform.

All of the standard cars are the product of Russian car builders, four manufacturers having built 331 motor cars of the type shown in the engravings. The underframe of these cars is of steel construction, the side frames being channels $4\frac{3}{4}$ in. deep and reinforced with steel plates $13\frac{3}{8}$ in. deep by $\frac{3}{16}$ in. thick. There are two center and two intermediate sills which are $2\frac{1}{4}$ by $1\frac{3}{16}$ tees.

There are 150 trail cars of the type shown in the engraving, the majority of which are the product of Russian car works. These cars have the same seating arrangement as the standard motor cars. There are also 66 trail cars with longitudinal seats and seating capacity for 30

persons, but the cars with seating arrangement corresponding to that shown on a preceeding page has met with greater favor.

The guage of the Moscow tramways is 5 ft. and the radius of the sharpest curve is 50 ft. There are a few grades 100 to 300 feet long which range from 5 to 8 per cent.

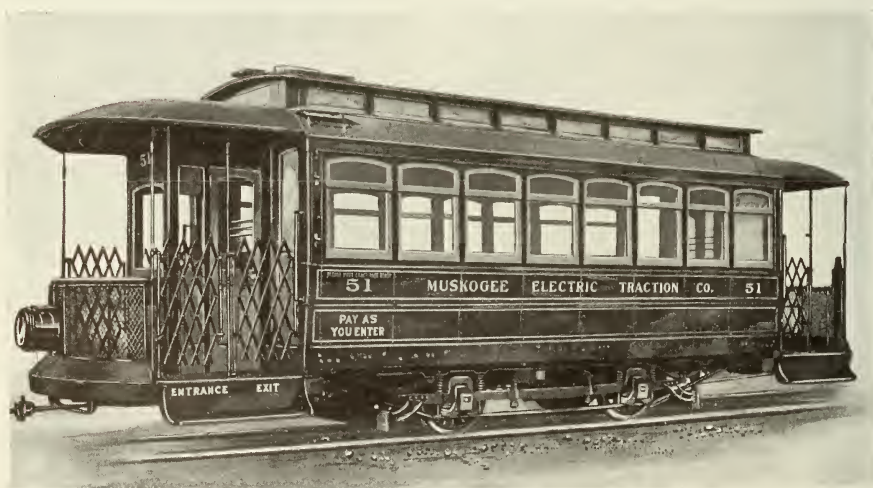
The number of passengers carried in the year 1908 was 94,841,024.

For the facts embodied in the above article, we are indebted to M. Sheremetewsky, 25 Old Basamanow Street, Moscow.



ONE MAN PAY-AS-YOU-ENTER-CARS EQUIPMENT FOR OKLAHOMA

SIX Pay-As-You-Enter cars for one-man operation were recently delivered by the Danville Car Company for the rapidly growing city of Muskogee, Oklahoma. The cars have standard Pay-As-You-Enter non-vestibuled platforms at both ends with folding gates at the steps on both sides. The rear platform gates are



ONE-MAN PAY-AS-YOU-ENTER CARS—There is A Square Motorman's Cab on the Platform—Passengers Entering the Car Pass In Front of It and Drop Their Fares In A Fare Box

closed and locked and passengers enter and leave by the front platform. In this respect the cars follow the scheme of operating the one-man Pay-As-You-Enter cars for Brunswick, Ga., which were described in Brill's Magazine for December, 1909. An unusual feature appears in the use of motor-man's cabs about three feet square which are located against the bulkheads between the entrance and exit doors and which take the place of vestibules. Each cab has a folding side-entrance door and a single drop sash at the front. Passengers boarding the cars must pass the motor-man and as they do so drop their fares in a fare box which is hung from the window of the motor-man's cab. The type of fare box which is used for the Muskegon cars is Brill No.

4A which is equally suitable for either tickets and coins or for both.

To prevent passengers boarding at the rear of the car the steps on both sides are protected by folding gates, as stated above, which are fitted with locks. To prevent confusion by passengers attempting to leave the car at the rear, a folding seat is provided which may be placed in position against the bulkhead and extending across both doorways. This feature is shown in one of the accompanying engravings.



ONE-MAN PAY-AS-YOU-ENTER CARS—The Platform At Both Ends of the Cars Are Alike—The Use of the Rear Platform is Prohibited by the Folding Gates Which Are Arranged to Lock

The cars have longitudinal seats and in general dimensions are standard 21-ft. closed single truck cars as follows:—

Length over end panels	21 ft. 0 in.
Length over platform crownpieces	32 ft. 0 in.
Length over each platform	5 ft. 6 in.
Length over bumpers	33 ft. 0 in.
Width at sill including panels	8 ft. 6½ in.
Truck wheel base	8 ft. 0 in.
Track gauge	4 ft. 8½ in.
Wheel diameter	33 in.

The trucks, which are the Brill No. 21-E type, have pipe trussrod supports at the ends to carry the extra weight due to the platforms of

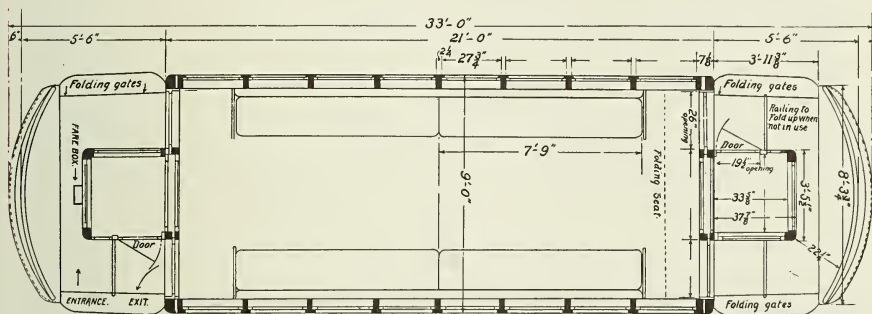


ONE-MAN PAY-AS-YOU-ENTER CARS—Interior Showing the Method of Preventing the Use of the Rear Platform and At the Same Time Increasing Seating Capacity

slightly increased length embodying the Pay-As-You-Enter arrangement.

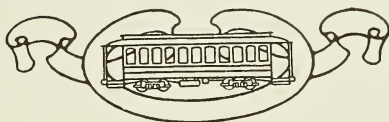
The interior finish is ash with birds-eye maple veneer ceilings. The seats are upholstered in cane. Push buttons are provided on each side

post and the cars are equipped with electric heaters, eight per car. The windows are of the usual drop sash variety in two sections, the upper one of which is fixed. Pantasote curtains are used. Both the entrance and exit doors slide towards the center of the car, the pocket in the bulkhead back of the motorman's cab being deep enough to



ONE-MAN PAY-AS-YOU-ENTER CARS—All Passengers Board and Alight At the Front of the Car—A Portable Folding Seat Across the Rear Bulkhead Prevents the Use of the Rear Platform

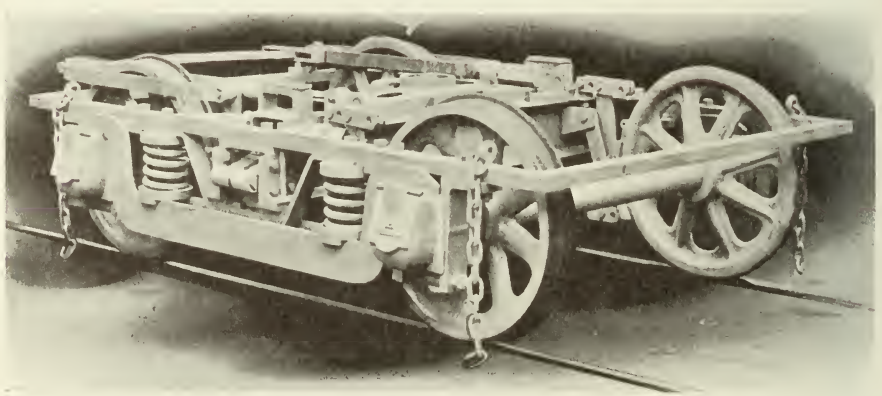
permit both doors to be pushed into the pocket without interference. The arrangement of these doors and of the platform gates, folding seat and the platform railing, which is a more or less necessary feature of the Pay-As-You-Enter arrangement on all cars of the type, is indicated clearly by the accompanying plan.



TRUCK BRAKE RIGGING ACCESSIBILITY

SOMETHING MORE ABOUT THE No. 27-M. C. B. TRUCK

THERE is no part of any truck which requires more careful maintenance than the brake rigging. Aside from the wheels and axles the brake rigging is more constantly in use than any other part of the truck and in view of this fact and the violent action which it receives when used, it is not surprising that repairs and adjustments are a frequent necessity. While the claim is made that the brake rigging of the Brill No. 27-M. C. B. truck is



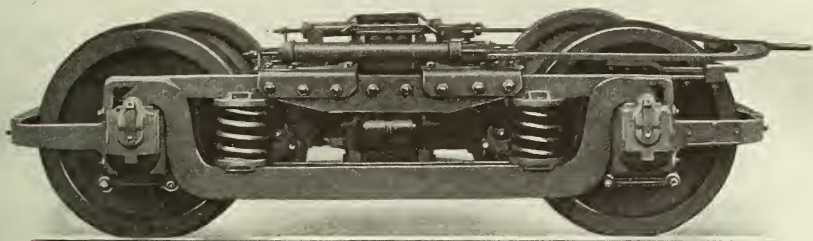
BRAKE RIGGING ACCESSIBILITY—The Usual Type of M. C. B. Truck—The Truss Under the Top Chord of the Side Frame and the Extensions of the Transoms Occupy the Space Between Equalizer Springs and Preclude Brake Repairs from the Side

simpler in design than that of any other truck of the M. C. B. type and accordingly that it is easier to repair and maintain, it is not claimed that it is any less subject to the ordinary effects of wear and tear than any other brake rigging of first class manufacture.

But in considering the circumstances of brake rigging maintenance requirements it may be worth while to examine the engravings on the accompanying pages and note the comparative accessibility of the brake rigging of the Brill No. 27-M. C. B. and the brake rigging of other types of M. C. B. trucks. In the ordinary design of M. C. B. truck

the space between the equalizing springs is almost entirely filled by the center truss for supporting the top member of the side frame, by the extensions of the transoms or by the castings which are sometimes used under the center truss. What little space there is between the equalizing springs is so broken up by the position of the parts referred to, that the brake rigging is practically inaccessible from the side and the truck must in nearly every case be brought over a repair pit when repairs of any extent are necessary.

The Brill No. 27-M. C. B. truck on the other hand by reason of the design and the use of solid forged side frames has a large open space between the equalizing springs, and the brake shoes, brake hangers, brake rods and other parts are readily reached with whatever tools may



BRAKE RIGGING ACCESSIBILITY—The Brill No. 27-M. C. B. Truck—The Ample Working Space Between the Equalizer Springs Makes it Possible to Renew or Adjust Brake Parts Without Placing the Truck Over A Repair Pit

be necessary. The large amount of working room for repair purposes is clearly shown in the engraving. The other parts of the brake rigging are equally accessible. The construction it may be noted secures a material saving in weight.

The No. 27-M. C. B. truck has met with remarkable favor. In the period of 40 days from October 1 to December 10, 1909 orders were received from five roads for 82 No. 27-M. C. B. trucks of various sizes as reported in the December number of Brill Magazine. Since that date and prior to April 1, or in a period of slightly over three months, orders totaling 245 trucks have been received. Inasmuch as the truck has been on the market scarcely six months it bids fair to surpass the remarkable record of the No. 39-E for volume of sales.

The following is the list of orders received between December 10 and April 1:—

Northern Ohio Traction & Light Company . . .	12 No. 27-M. C. B. 2
Central Kentucky Traction Company . . .	4 No. 27-M. C. B. 3
Benton Harbor & St. Joseph Ry. & Lt. Co. . . .	4 No. 27-M. C. B. 2
Allegheny Foundry Company . . .	1 No. 27-M. C. B. 2
Central California Traction Co. . . .	16 No. 27-M. C. B. 2
Grand Junction & Grand River Valley Ry. . . .	8 No. 27-M. C. B. 2
Public Service Railway . . .	190 No. 27-M. C. B. 1
Martinez & Contra Costa County Ry. . . .	6 No. 27-M. C. B. 1
Evansville & Southern Indiana Traction Co. . . .	2 No. 27-M. C. B. 1
Norfolk & Southern Railway . . .	2 No. 27-M. C. B. 2
Total . . .	245



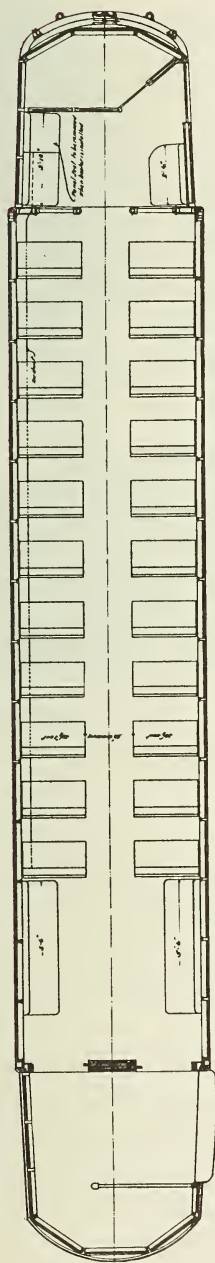
LARGE CITY CARS FOR CLEVELAND

PAY-ENTER TYPE

CLEVELAND has the longest cars in regular operation in any city of the United States. Twenty-five cars recently delivered to the Cleveland Railway Company by the G. C. Kuhlman Car Company are 52 ft. over buffers. The exceptionally long platforms which are used limit the length of the car body to 36 ft. which, however, is very long for a city car and gives



LARGE CITY CARS FOR CLEVELAND—The Car Shown, Which is One of An Order of Twenty-five Built by the G. C. Kuhlman Car Company, is 52 ft. Long Over Bumpers—The Seating Capacity is 54 Persons



LARGE CITY CARS FOR CLEVELAND—In Addition to the Large Seating Capacity There is Ample Standing Room and the Carrying Capacity is Almost Unlimited—The Front Exit is Controlled by the Motorman.

a seating capacity of 54 passengers. The cars were ordered several months ago when the property was in the hands of receivers and was operated as the Municipal Traction Company. During that time the first prepayment cars were placed in operation and the name "Pay-Enter" was applied to them and now by usage and by the terms of an ordinance by which the Cleveland Railway Company has regained control of the city properties in Cleveland, the term "pay-enter" is used in that city to cover any "car provided with a fare box and so arranged as to effectively provide for the prepayment of fares by passengers." Thus the term "pay-enter" covers both the cars described in the article which have the standard Pay - As - You - Enter arrangement and other types of prepayment cars, some of which have been created by rebuilding old equipment.

The twenty-five cars which have recently been delivered by the G. C. Kuhlman Car Company are the single-end type and are mounted on Brill No. 27-G1 trucks. The rear platform, which is 7 ft. 11½ in. long is vestibuled except at the steps and has a large section available for smokers use as shown in the accompanying floor plan. The front platform, which is 7 ft. 2½ in. long is fully vestibuled and is separated from the car body only by a pipe railing and pipe stanchions which are used in lieu of the usual bulkhead. Provision is also made on the front platform for short longitudinal seats for passengers. One of these seats is removable so that a heater can be installed. A motorman's compartment of ample size with sliding door is provided on the front platform.

The following is a tabular statement of the principal dimensions of the cars:

Length over buffers	52 ft. 0 in.
Length over front vestibule	7 ft. 2½ in.
Length over rear vestibule	7 ft. 11½ in.
Length over corner posts	36 ft. 0 in.
Width over fender rail (widest part)	8 ft. 6 in.
Width over posts	8 ft. 2 in.
Width over sills	8 ft. 1 in.
Height bottom of sill over roof	8 ft. 6 in.
Bolster centers	24 ft. 0 in.

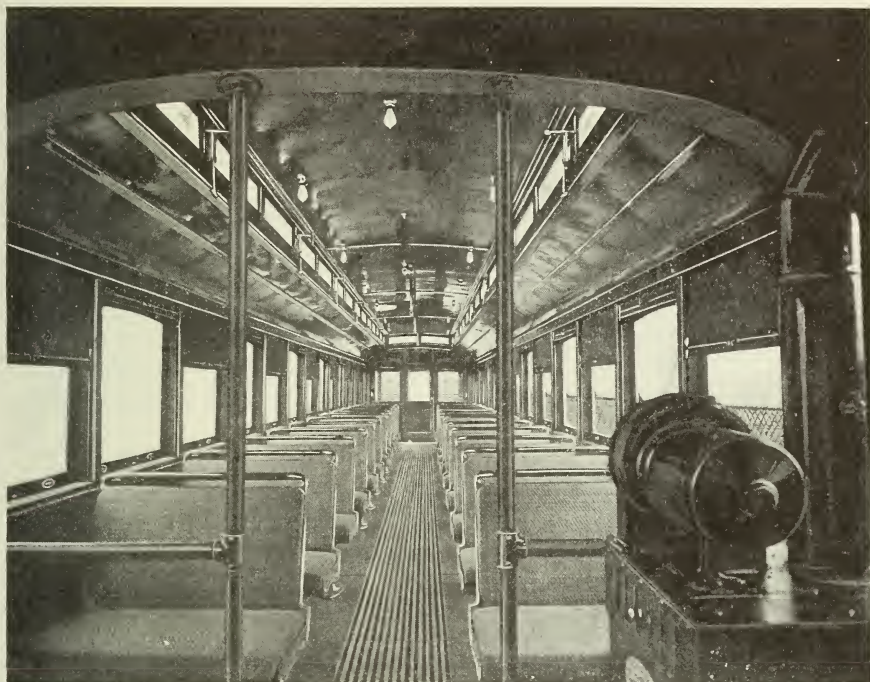
The unusual width over posts makes it possible to use seats 38½-in. long and still have an aisle 23-in. wide. The seats are upholstered in rattan and the interior finish of the cars is cherry which was treated as follows:

1. Prime with coat of boiled linseed oil
2. Coat of cornstarch filler
3. Coat of rubbing varnish
4. Rub with pulverized pumice and felt
5. Coat of rubbing varnish
6. Rub with pulverized pumice and felt
7. Coat of rubbing varnish
8. Rub with pulverized pumice oil and felt sufficient to take off gloss.

Thus it will be seen that all interior woodwork received three coats of varnish which were rubbed to a dull finish. All outside woodwork such as sash and doors which were exposed in addition had a coat of finishing varnish.

One of the features of the cars is the method of heating which is by forced circulation of hot air. Mention has already been made of the provision for a heater on the front platform. This heater is provided with a motor driven fan which draws air through an opening in the car floor, forces the air in contact with the stove and expels it through a duct extending along the side of the car.

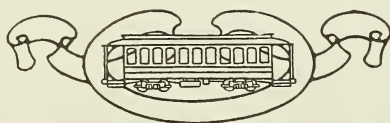
Owing to the length of the cars it is interesting to note that the bottom framing provides for continuous one-piece side sills of yellow pine without plate reinforcing. The end sills, needle beams and diagonals are white oak, the end sills being reinforced with steel plates. The framing is braced diagonally and transversely and all corners are gusseted. The platforms are supported by outside knees of girder construction composed of sheet steel flanked by angles. The center



LARGE CITY CARS FOR CLEVELAND—Interior View Showing the Pipe Rail and Stanchions Which Takes the Place of A Front Bulkhead—The Forced Circulation Hot Air Heater Shown in the Foreground is Located on the Front Platform

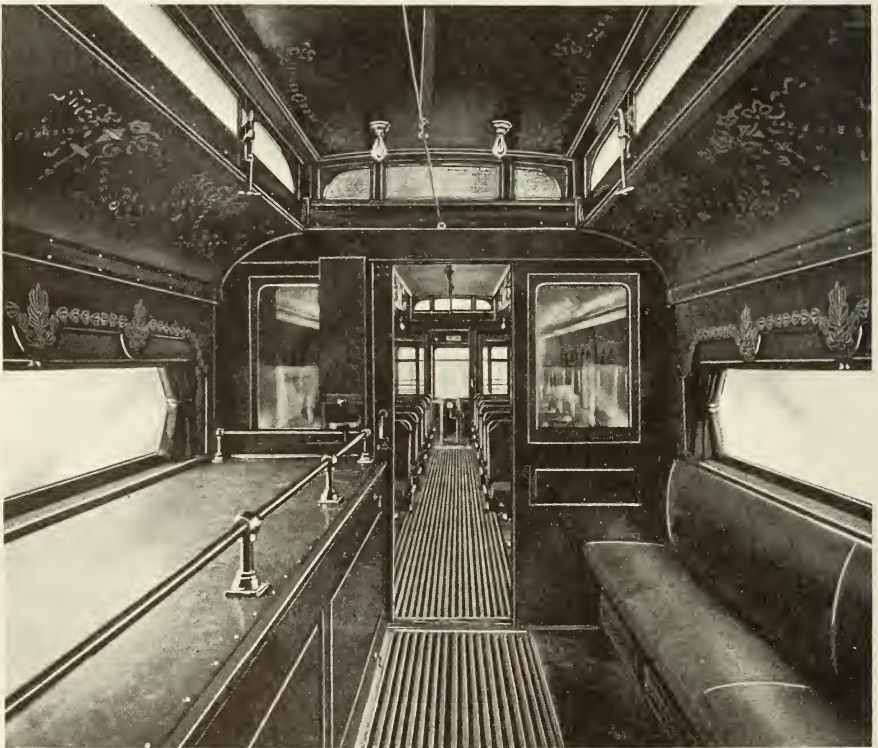
knees are white oak reinforced with steel angles extending in a continuous piece from the body bolster.

Each car is equipped with four 40 h. p. motors and weighs complete with trucks and all equipment about 49,000 lb.



SPECIAL EQUIPMENT FOR THE CHICAGO CITY RAILWAY FUNERAL CARS

THE use of funeral cars on the electric railways of Chicago has reached the stage where the Chicago City Railway Company has found it advisable to add two more cars of that type to the equipment of the Calumet & South Chicago Railway. The new cars which were built by the G. C. Kuhlman Car Company are 43 ft. long over bumpers and have two compartments, one of which is for the casket and pallbearers and the other for the



SPECIAL EQUIPMENT FOR THE CHICAGO CITY RAILWAY—Interior of Pallbearers' Compartment—The Interior Finish of the Cars is Mahoganyized Cherry



SPECIAL EQUIPMENT FOR THE CHICAGO CITY RAILWAY—Funeral Cars for the Calumet & South Chicago Lines—Mounted on Brill No. 27-F Trucks and Conforming in General Features to the Standard Equipment of the Chicago City Railway

passengers or mourners. In general outline the cars conform to the standard Chicago City Railway Car and they are of the double-end type. The passenger or mourner compartment occupies the space of four of the double windows which are a characteristic feature of the Chicago cars and the pallbearers' compartment has a single window with arch top on each side. It is this difference in the windows of a portion of the car that makes the principal difference in exterior appearance and outline as compared with the regular equipment.

The passenger or mourner compartment has 12 transverse seats and four stationary longitudinal seats and will seat 32 passengers. The



SPECIAL EQUIPMENT FOR THE CHICAGO CITY RAILWAY—Funeral Car With Casket Compartment Opened—The Inside of the Lowered Door and the Floor of the Compartment is Fitted With Rollers on Which the Casket is Placed

interior finish of this and the pallbearers compartment is mahoganized cherry. The seats are upholstered in Spanish leather. The usual curtains are employed and in addition to the side windows, inside end and partition windows are fitted with black drapery curtains with tastefully decorated lambrequins above.

One side of the pallbearers compartment has a longitudinal seat extending from the bulkhead to the partition; the other side has a



SPECIAL EQUIPMENT FOR THE CHICAGO CITY RAILWAY—Interior of the Passenger Compartment Which Seats 32 Persons—The Seats are Upholstered in Spanish Leather and Special Black Draperies Are Used At the Windows

casket compartment for holding the casket. The casket is placed in the compartment from the outside, a door being provided which opens downward and when open is supported horizontally by chains. The inside of the door and the floor of the compartment is fitted with rollers for the carriage on which the casket is placed. The casket compartment which is finished in white and gold is also accessible from the

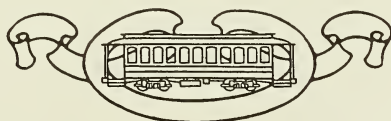
inside of the car by means of a removable panel. The space above the casket in the pallbearers compartment is available for flowers, a light sheet brass covering and an ornamental rail being provided.

The underframe of the car is steel, 10-in. channels being employed for the side sills and reinforced with 3 by $2\frac{1}{2}$ by $\frac{5}{8}$ -in. steel angles riveted with the 3-in. leg flush with the bottom of the channel, except the portion of the sill on the side of casket compartment. For the full length of the casket compartment door opening a 10-in. channel is used for the side sill reinforcing. The channel side sills which come directly below the window sash pockets have 3 by 1-in. slots cut between the posts for the escape of waste which collects in the sash pockets.

The following are the principal dimensions of the cars:

Length over bumpers	43 ft. 1 in.
Length over crownpieces	42 ft. 1 in.
Length over end panels	32 ft. 1 in.
Width over side sill angles	8 ft. $0\frac{1}{2}$ in.
Width over guard rails	8 ft. 6 in.
Height top of rail to top of trolley board	11 ft. 10 in.

The cars are equipped with removable storm sash on all the side windows and are provided with wire screen sections for use in summer. Each car is heated with seven truss plank and four panel electric heaters in the passengers compartment and four panel heaters in the pallbearers compartment. The cars are lighted with frosted incandescent lights. Push buttons are provided on each window post, the draperies are readily removable and otherwise the cars could be adapted with little difficulty to other than funeral service.



STRAIGHT-SIDE CLOSED CARS FOR NEW ENGLAND

NEW EQUIPMENT FOR THE CONNECTICUT VALLEY STREET RAILWAY

THE Connecticut Valley Street Railway Company added to its equipment a few months ago some cars of the type shown in the accompanying engravings. The equipment, which was built by the Wason Manufacturing Company, has the following principal dimensions:

Length over corner posts	30 ft. 0 in.
Length over crown pieces	39 ft. 3 $\frac{3}{4}$ in.
Width over sills	8 ft. 3 $\frac{1}{4}$ in.
Height from under side of sill over trolley board	8 ft. 7 $\frac{1}{4}$ in.
Height inside from floor to ceiling	7 ft. 6 $\frac{7}{8}$ in.



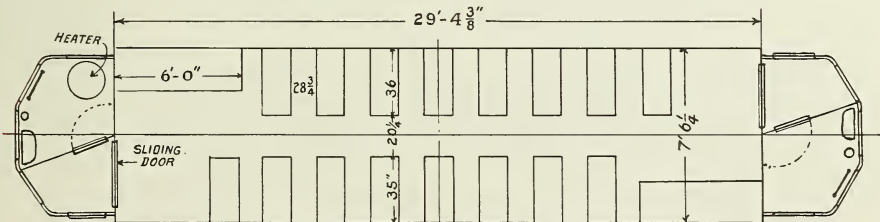
STRAIGHT-SIDE CLOSED CARS FOR NEW ENGLAND—The Cars Have Mahogany Interior Finish and Plush Upholstered Seats—The Bulkhead Entrance and Exit Doors Are At Diagonally Opposite Corners of the Car



STRAIGHT-SIDE CLOSED CARS FOR NEW ENGLAND—The Length Over All is 39 Feet—The Seating Capacity is 44 Persons—The Cars Were Built by the Wason Manufacturing Company

The cars are an excellent example of the straight side full vestibuled car with steam coach roof. They are the double-end type and have drop platforms which are 4 ft. $7\frac{3}{4}$ -in. long.

The seating arrangement and the platform arrangement, which are in this case closely related, are both somewhat unusual. The seating arrangement is necessarily altered from the usual standard arrangement with short longitudinal seats at the ends in order to provide for an easy access bulkhead doors. The position of the bulkhead doors at one side provides room for a diagonal platform partition extending from the center line of the car body at the bulkhead to the front of the vestibule and forming a motorman's cab. There is a folding exit door in the cab partition and at one end a hot water heater is installed in a corner of the motorman's cab.



STRAIGHT-SIDE CLOSED CARS FOR NEW ENGLAND—The Location of the Bulkhead Doors is In Accordance With the Easy Access Arrangement

The interior of the cars is finished in mahogany, and reversible seats, upholstered in plush are used. There are 16 of these which, with the diagonally opposite 6-ft. longitudinal seats, give each car a seating capacity of 40 persons.

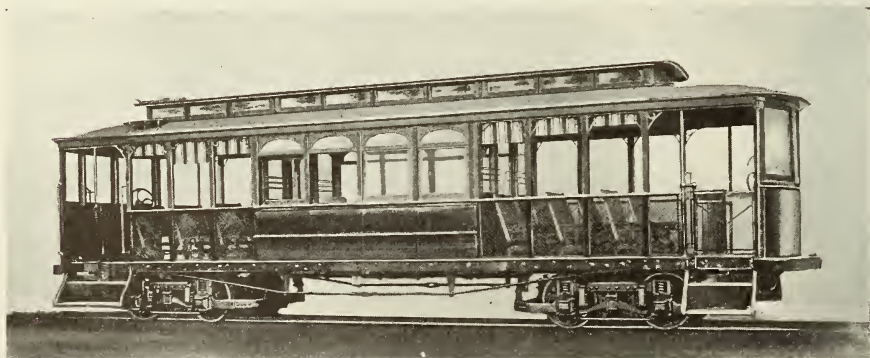
The cars have steel underframes of which the principal members are 6-in. Z-bar side sills and 12-in. channel center sills. The end sills are also 6-in. Z-bars.



CARS FOR THE FRESNO TRACTION COMPANY

CALIFORNIA COMBINATION TYPE

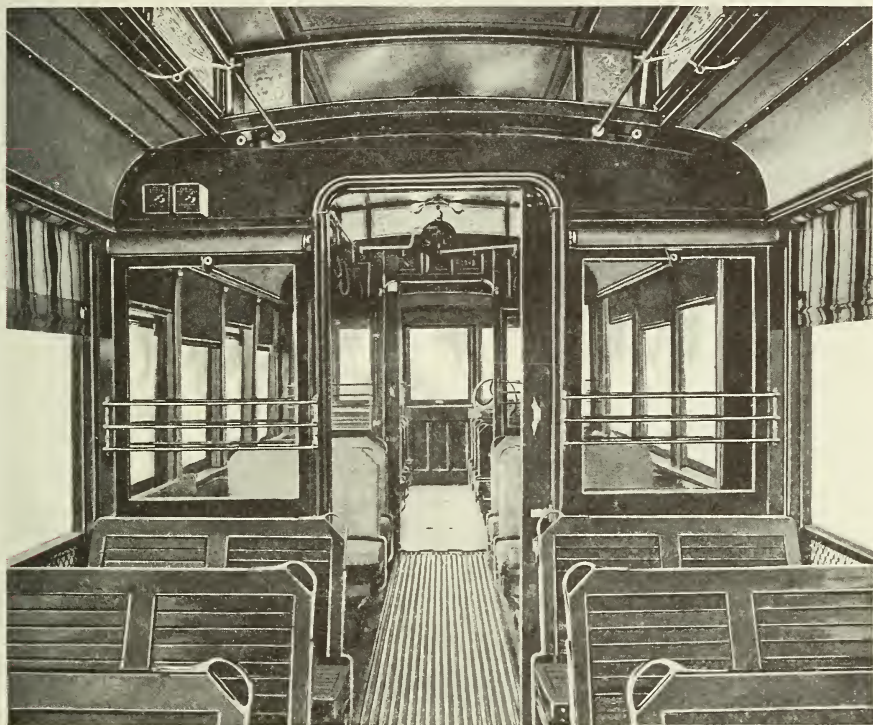
SOUTHERN CALIFORNIA'S climate is so mild throughout the year that at certain hours almost every day an open car is desired by passengers; but a closed car is almost an equal necessity after sundown. It is these conditions which have resulted in the development of a combination open and closed car which is in general use in California to the exclusion of most other parts of the country and which has accordingly become to be known



CARS FOR THE FRESNO TRACTION COMPANY—Ten Cars of the Above Type Mounted on Brill No. 27-GE1 Trucks Have Recently Been Delivered by the American Car Company

as a California type car. Ten cars of this type were included in a recent shipment of the American Car Company to the Fresno Traction Company.

The cars in question are 36 ft. long over all and have a center closed section which is 11 ft. 4 in. long. The entire floor of the car,



CARS FOR THE FRESNO TRACTION COMPANY—The Center Closed Section Will Seat 16 Passengers and the Two Open Sections At the Ends 12 Passengers Each—The Interior Finish is Mahogany

including platforms is at the same level and there are three steps placed next to the closed section leading from the car to the ground. The construction permits the use of continuous I-beam center sills 4-in. deep (10.5 lb.) and extending from bumper to bumper. There are also 5-in. (14.75 lb.) I-beam intermediate sills extending from bumper to bumper. The side sills are in three parts, one extending the length of the closed section and the other two extending from the steps. These sills are long leaf Southern pine $4\frac{1}{2}$ by 5-in. plated on the outside with

a 5 by $\frac{5}{8}$ -in. steel plate extending the entire length of the car and bent to provide for the step recess. The crossings are white oak and are fitted with truss rods.

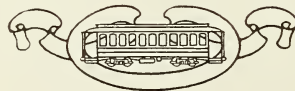
The closed section of the car has eight transverse seats which are upholstered in rattan. The windows are of the usual drop sash variety, two sash being employed between each post, and the upper one being fixed and the lower one arranged to drop into a wall pocket. The interior finish of the closed section is mahogany. Sliding doors 30-in. wide are provided in the bulkhead.

The open sections of the car have wood slat seats. The ends of the car are vestibuled, mahogany sash being employed, and the inside of the vestibule hood has mahogany finish. Diamond mesh wire screens with $\frac{3}{4}$ in. channel frames are used between posts and are shaped concave to provide for the sweep of the posts.

The cars are mounted on Brill No. 27-GE1 trucks and have the following dimensions:

Length over all	36 ft. 0 in.
Length over dashers	34 ft. 6 in.
Length of closed section	11 ft. 4 in.
Width over lower step (extreme)	9 ft. 2 in.
Width over posts at belt rail	8 ft. 2 in.
Height of each step	12 $\frac{1}{2}$ in.

The cars weigh 26,400 lb. each complete with trucks, and without motors. The trucks weighed 5600 lb. each, or a total of 11,200 lb. and the carbody 11,200.



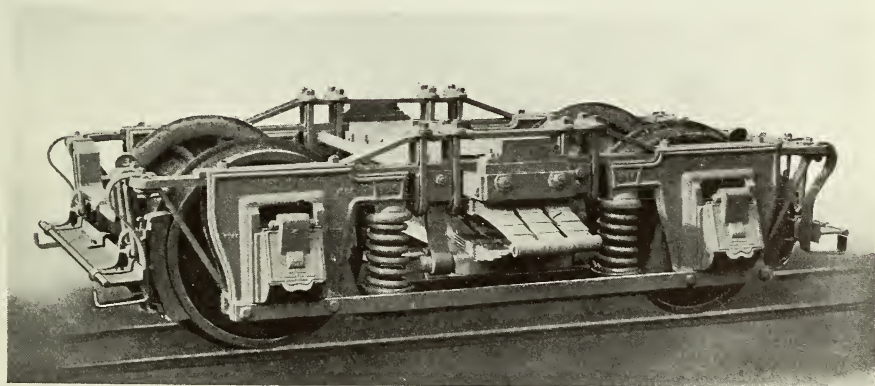
MORE WASON EQUIPMENT FOR THE GUATEMALA RAILROAD

OBSERVATION CARS

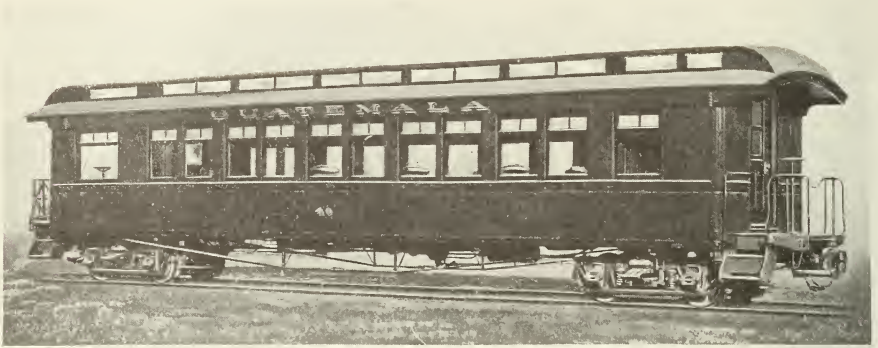
IN addition to the equipment for the Guatemala Railroad which was described in Brill Magazine for February, the Wason Manufacturing Company has shipped to the road during the past month three observation cars and a business car for the use of the general manager. The dimensions of the equipment are as follows:

	Business car	Observation car
Length over platform end sills	39 ft. 6 in.	38 ft. 0 in.
Length of body over corner posts	37 ft. 2 in.	32 ft. 0 in.
Length of observation platform	9 ft. 8 in.	7 ft. 2 in.
Width over side sills	8 ft. 0½ in.	8 ft. 0½ in.

The underframing of both types of equipment corresponds to that of the equipment described in the February number of Brill Magazine, namely: two 7-in. channel side sills, two 7-in. I-beam center sills and two 6-in. I-beam intermediate sills, end sills reinforced with 6-in. I-beams and cross timbers of oak. The body bolsters are of wrought plates 8 by ⅞ in. and 8 by 1 in.



MORE WASON EQUIPMENT FOR THE GUATEMALA RAILROAD—The Trucks are of All-Steel Construction
The Side Bearings are Outside the Truck Frames Owing to the 3-foot Track Gauge



MORE WASON EQUIPMENT FOR THE GUATEMALA RAILROAD—One of Three Chair Cars With Observation Platform—The Length Over Platforms is Thirty-eight Feet

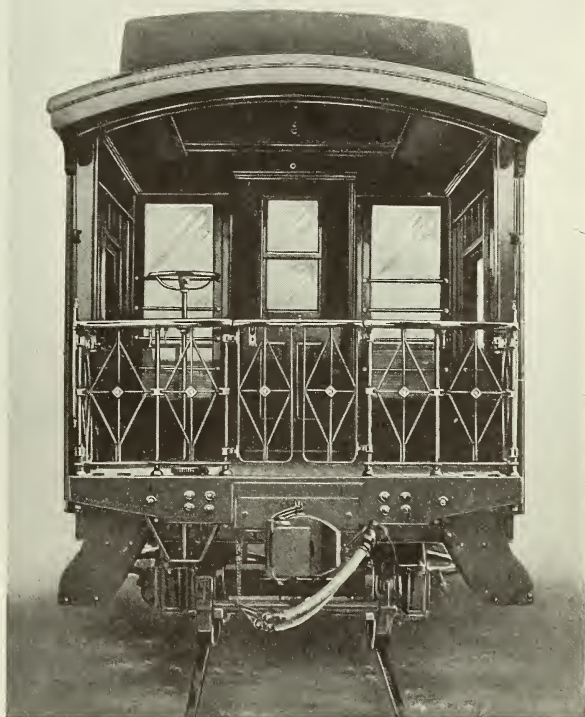
The cars are mounted on all-steel trucks built by the Wason Manufacturing Company and shown in an accompanying illustration. The trucks have steel pedestal castings which are tied together by a



MORE WASON EQUIPMENT FOR THE GUATEMALA RAILROAD—Interior of Observation Chair Car Looking Toward the Observation Platform—Each Car Has 24 Chairs—The Interior Finish is Mahogany

continuous forged upper chord and a one-piece tie bar. The upper chord has a truss which is carried above instead of below the bolster and from this truss and the top chord, the bolster spring seat is supported. The bolster ends extend beyond the truck frame sufficiently to allow outside side bearings, the car bodies being 8 feet wide over sills and the track gauge only 3 ft. Triple elliptic bolster springs are used. The truck wheel base is 5 ft. and the wheels are 26-in. in diameter and steel-tired. The brake rigging, which is outside hung, includes all-metal brake-beams.

The interior of the observation cars is finished in mahogany and has 24 wicker chairs. At the end of the car without observation platform there is a lavatory with a door opening from a passageway at one side of the car. Against the lavatory bulkhead in the main compartment of the car there is a leather covered lounge with leather covered pillow and head roll. The floor of the main compartment is suitably carpeted and a curtain of corresponding color is supported across the passageway to the lavatory. There is the usual equipment of water cooler, lamps, etc., and there is also a small buffet equipment with ice chest and cupboards. Four small mahogany tables are provided



MORE WAGON EQUIPMENT FOR THE GUATEMALA RAILROAD—The Platform Railing is Iron With Brass Capping—The Floor is Covered With Linoleum



MORE WASON EQUIPMENT FOR THE GUATEMALA RAILROAD—Interior of General Manager's Business Car—The Stationary Seats Make Up Into Lower Berths

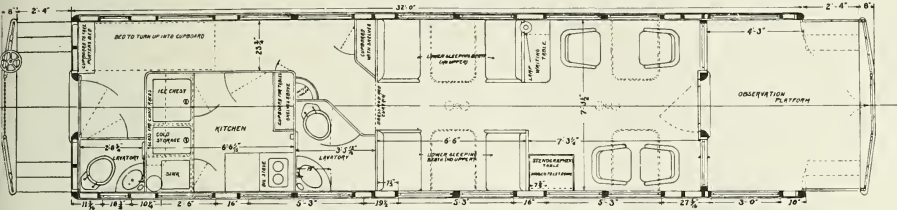
which are arranged to hook into the side of the car at convenient distances. The observation platform has an iron railing with brass



MORE WASON EQUIPMENT FOR THE GUATEMALA RAILROAD—Thirty-nine Foot Business Car With Observation Platform at One End

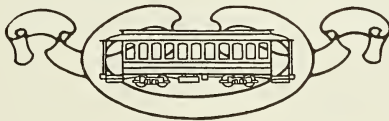
capping. The platform floor is covered with linoleum and is provided with trap doors over the steps.

The business car has an extra large observation platform and a compartment at the end with chairs and of the same general type as the observation cars. The car also has four fixed seats which are



MORE WAGON EQUIPMENT FOR THE GUATEMALA RAILROAD—Plan of Business Car

arranged to make up as lower berths, a lavatory, a well arranged and fairly large kitchen, and a folding cot berth and a lavatory for the porter. In the compartment with movable chair seats there is a writing table and a stenographer's table, the latter hinged to let down. The car has many conveniences, such as electric bells, thermometer, speed recorder, etc., and is finished in inlaid mahogany. The kitchen has a thoroughly insulated ice chest, copper-lined sink, cupboards for glass ware and china, table rack, shelves and oil stove.



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FUNERAL CARS of the type described on another page are only one of the many types of special equipment which electric railways can use as income producers. Other types such as ash and coal cars offer a means of reducing expense. Inasmuch as the resourceful manager watches both income and expense with equal care, both classes of cars should be of interest to him, but not necessarily a wise investment. Unfortunately the various local legislative bodies which govern the destinies of electric railways have generally seen fit to restrict to the carrying of passengers the services which the electric railways may perform, and consequently the possible instances are limited in which special equipment may be profitably acquired. On broad economic lines this is a mistake and rather the electric railways should be permitted in every possible way to render service to the general public. Fortunately there is

a growing appreciation of the wisdom of such license and doubtless it will continue to grow, being cultivated largely by increased costs in every direction and by the resulting demands of the electric railways that every possible source of revenue be opened to them. We believe not only that city electric railways should be permitted to transport freight and express for themselves and others over their lines with certain restrictions, but that city electric railways should be employed for the transportation of mail wherever possible; that they should be given contracts covering street sprinkling and that generally as public service corporations their services should be employed whenever it is possible to do so with mutual profit.



RAILWAY AGE GAZETTE comments editorially in a recent number on the difficulties encountered by the young technical graduate whose thoughts at this time of year turn towards a job. After reiterating the well known fact that there is no escape from the severe competition in the lower strata for some years after graduation, but that there is plenty of room at the top, attention is called to the large number of technical graduates which are annually absorbed by the railways and to the opportunity which railway work offers. The reference is doubtless to the steam railways, for

the number of technical graduates at present entering electric railway work is remarkably small. From the standpoint of absence of competition, the opportunity is accordingly greater and we are convinced that it is not the perspective that leads us to say that the opportunity in electric railway work is greater for other reasons. Our appreciation of the need for technical graduates in electric railway work and the equal realization of the need by the electric railway themselves, is evidenced in our annual Brill Thesis Prize offer of \$500, which has the support of the American Street & Interurban Railway Association.



IT is the small consumer, the small dealer, the small electric railway that supposedly always has to pay the highest prices, take what the big man gives him and thank his stars if he manages to survive. That has been the theory for a good while past, is still the belief of a great many and is doubtless largely true. But there is an old theory which has recently been brought forward with prominence and which has been proven to be a fact. It is that the small consumer can and does control the situation provided he cooperates with his fellow small consumers. In electric railway work this is just as surely the case as in farming, merchandising or in any other business and there are more than a few isola-

ted instances of a present tendency of electric railways to cooperate—the American Street & Interurban Railway Association is probably the most prominent. However, we refer more particularly to organized cooperation for actual operating purposes, such as for the purpose of obtaining expert engineering advice, standardization of equipment, wholesale purchases, etc. The Stone & Webster organization typifies organization of this sort among the larger electric railways and there are the Clark properties, the Interstate Railways and others, some of which, however, represent consolidation and excessive speculative capitalization of the future rather than cooperation. Cooperation which offers the best opportunity for the salvation of the small electric railways is yet in its infancy. It involves a community of interest by a number of roads of small track mileage in towns with a population of less than 50,000. Roads of this sort operate under conditions so nearly the same that standardization of equipment and consequently of purchases could be effected. A general superintendent of purchasers, a general superintendent of motive power, a chief engineer and an electrical engineer to have general supervision over the respective departments of all the railways should be chosen and each should be a man of large caliber. The salaries of these men could be made sufficiently large to attract broad-gauged men of the highest ability who would displace the

corresponding individual officials of the several cooperating roads and thus materially reduce the aggregate salary expense. In addition, men of this caliber would save their salaries annually by the application of economies in purchasing and operation, which are possible only through cooperation and organization. However, the salvation of the small road by this method is less probable than by the methods so frequently connected with high finance, but either the cooperation of the small roads or their consolidation for operating purposes is a foregone conclusion for economic reasons.



UNTIL the small electric railways by cooperation or consolidation are able to obtain the services of expert engineers and the advantage of wholesale purchases, their only course lies in the exercise of the most careful discretion and the use of the sources of advice which are open. Fortunately, the technical journals of the electric railway field offer a large fund of information about the work of the larger and better equipped roads which by interpretation and digestion form a guide of great value. The technical journals are also closely in touch with the smaller progressive roads and the accounts of their experience and work are undoubtedly invaluable to the officials of railways of approximately the same size. The general information

to be obtained from publications is of wide extent. On special problems the proposition is different and we can not even attempt to suggest a general course of procedure. But on special problems connected with cars or trucks we believe we can be of service, for not only do we build more rolling stock than any other car builder, but there comes before us each year the car and truck problems of a majority of the electric railways of the country. We have an engineering department for the solution of these problems and the developments in car and truck construction, in which we are the admitted leaders, are the result of the satisfactory disposition of a number of similar problems and seldom the result of an isolated experience. It is sometimes said that we apply our extended experience for the benefit of the larger railways and that the smaller road must take what is given to him. The criticism is correct in that the larger roads receive the benefit first and rightly, for only thereby is it commercially possible for the smaller roads to receive the benefit. But it is unjust in that we strive to give as intelligent and careful service to the small roads as to the large and to adapt to the use of the small roads every improvement in rolling stock. An example of an economical adaption of the Pay-As-You-Enter idea for the use of small electric railways is found on another page of this issue in the description of the one-man Pay-As-You-Enter cars for Oklahoma.

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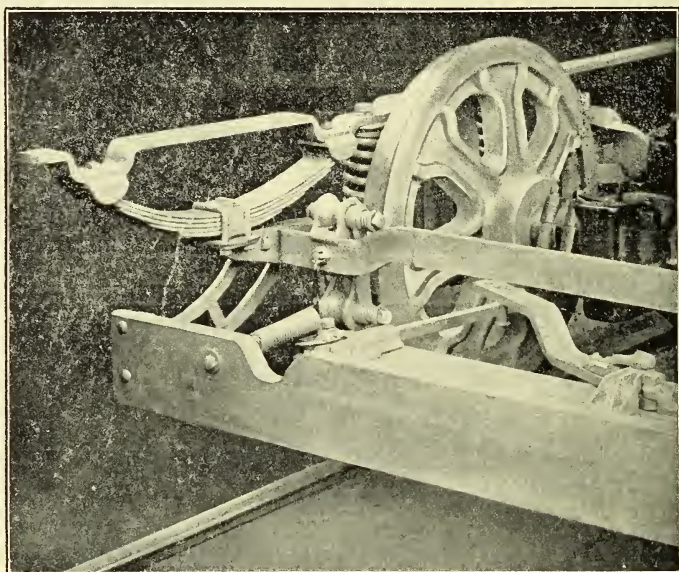
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BRILL HALF-BALL BRAKE HANGER

(Patented)

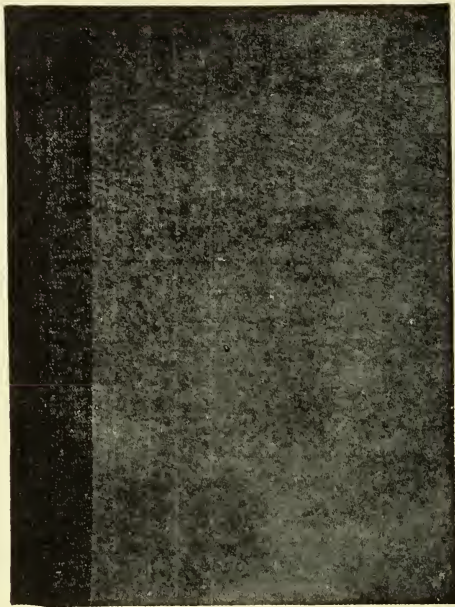
The thoroughly practicability of the Brill Half-Ball Brake Hanger is indicated by its wide range of application. It is adaptable not only to any Brill truck from the No. 21-E Truck, shown above, to the No. 39-E Single Motor Truck with pony wheel, but also to the trucks of other manufacturers. Let us figure on your requirements.

THE J. G. BRILL COMPANY
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BRILL
MAGAZINE



Main Street.
Winnipeg, Canada



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Robert W. Persson



BRILL MAGAZINE

Vol. IV

MAY, 1910

No. 5

R. D. APPERSON

[WITH PORTRAIT INSERT]

R. D. APPERSON, president of the Lynchburg Traction & Light Company and the Roanoke Railway & Electric Company, was born in 1863. He early evidenced an inclination for the transportation business inherited from one of his fore-bears, Richard Apperson who built the first steam railway in Kentucky, by entering the employ of the Pullman Palace Car Company as office boy in 1875. In 1886 Mr. Apperson became connected with the Little Rock & Citizens Street Railway Company, remaining with that company until 1890 when the property was sold. He then went to Staunton, Virginia, and in five months under his direction an electric railway was built in the interests of some of his New York and Arkansas friends who, on its completion insisted on his taking up the management of the property. While thus engaged he carried on a contracting business and later for the same interests built and operated an electric light and gas plant in Staunton and in order to keep himself fully occupied he and his friends purchased in 1899 and 1900 the Petersburg (Va.) Gas & Light Company and the Lynchburg Gas Company. Two years later in 1901 they purchased the Lynchburg Electric Railway & Light Company and the Lynchburg & Riverton Street Railway Company and these properties and that of the gas company were consolidated as the Lynchburg Traction & Light Company, of which Mr. Apperson is now the president. In 1903 the Apperson interests purchased the Roanoke Railway & Electric Company and they have established that property on the same substantial basis as the Lynchburg properties. On January 1, 1910, the Roanoke Railway & Electric Company and the Lynchburg Traction & Light Company were acquired by the American Railways Company, Mr. Apperson continuing as president and general manager of both of these properties and becoming a director of the American Railways.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

WINNIPEG, MANITOBA

WINNIPEG will probably be the railroad and commercial center of Canada. Already the city lays claim to the largest single railway yard in the world and has three railways with a total of 11 lines of track entering it from various directions. In many respects its situation geographically and with relation to the great agricultural country of Canada resembles the situation of Chicago with relation to the United States.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Standard Single-end, Longitudinal Seat, Closed Car of Winnipeg is 33 ft. Long and Seats 44 Passengers

Winnipeg has a population of 140,000 and there is a suburban population estimated at 24,000, all of which is served exclusively by the lines of the Winnipeg Electric Railway and two associated inter-urban electric railways. The latter two roads combined have 38.9 miles of track and the Winnipeg Electric Railway has 52.7 miles of track. In 1909 the gross receipts of the Winnipeg Electric Railway were \$2,623,731 and 26,382,773 passengers were carried; there were 8,925,349 transfers.

* This is the seventeenth of a series of articles, commencing in the January 1909 number of Brill Magazine, which describe in a general way the type of car in many of the larger cities of the world, with information indicating the conditions which have been the influencing factors in the adoption of the several types. The cities considered in previous articles have been in order of the appearance of the articles: Philadelphia, New York, Detroit, Chicago, Baltimore, London, Washington, New Orleans, Boston, Denver, Atlanta, Portland, (Ore.) Norfolk, Lisbon, Portugal; Milan, Italy and Moscow, Russia.

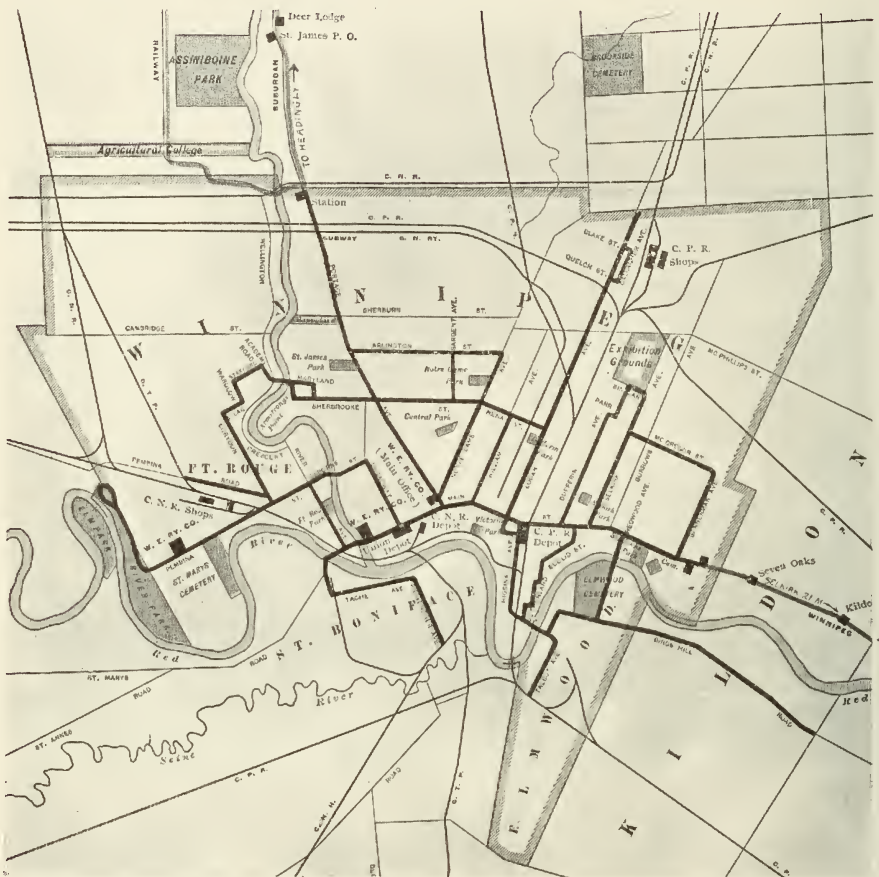
The company last year adopted for its standard car a 33-ft. 2-in. closed car body on Brill No. 27 GE1 trucks and built and equipped in its Saint Rouge shops during the year 30 cars of that type. During the present year 25 additional cars of the same type will be built and Brill No. 27-GE1 trucks for them are under construction. One of the standard cars which is shown in an accompanying engraving has the following dimensions and features:

Length over end panels	33 ft. 2 in.
Length over bumpers	45 ft. 5 in.
Length of front vestibule	4 ft. 6 in.
Length of rear platform	6 ft. 9 in.
Width over sills	8 ft. 3 in.
Seating capacity	44 persons
Weight - Car body (approximate)	22,000 lbs.
Trucks	13,140 lbs.
Motors and electrical equipment	12,750 lbs.
Air brakes and other equipment	1,900 lbs.

Total 49,790 lbs.

Trucks Brill No. 27-GE1
 Motors 4 G. E. 40 h. p.

The length of the car body, 33 ft. 2 in., exceeds the average of city cars for the United States, but has been adopted because the traffic is of good volume and reasonably steady throughout the day and by the use of a larger car the wage expense per car is relatively low for the number of passengers handled. The feature of economical operation by securing a reduction in the weight of the car equipment has not engaged the serious attention of the management because power is secured from an hydraulic generating plant of ample capacity for present and future needs. The consideration of weight expense has not been overlooked by any means, but in view of the fact that there are practically no heavy grades in Winnipeg, and in view of the low cost of current it is believed that heavier, more substantial and warmer car construction with resulting reduction in maintenance and depreciation charge overbalance the saving in the cost of operation. Increased traction through increased weight which secures rapid acceleration from stop to full speed, it is believed secures a superior service which is appreciated by the public.



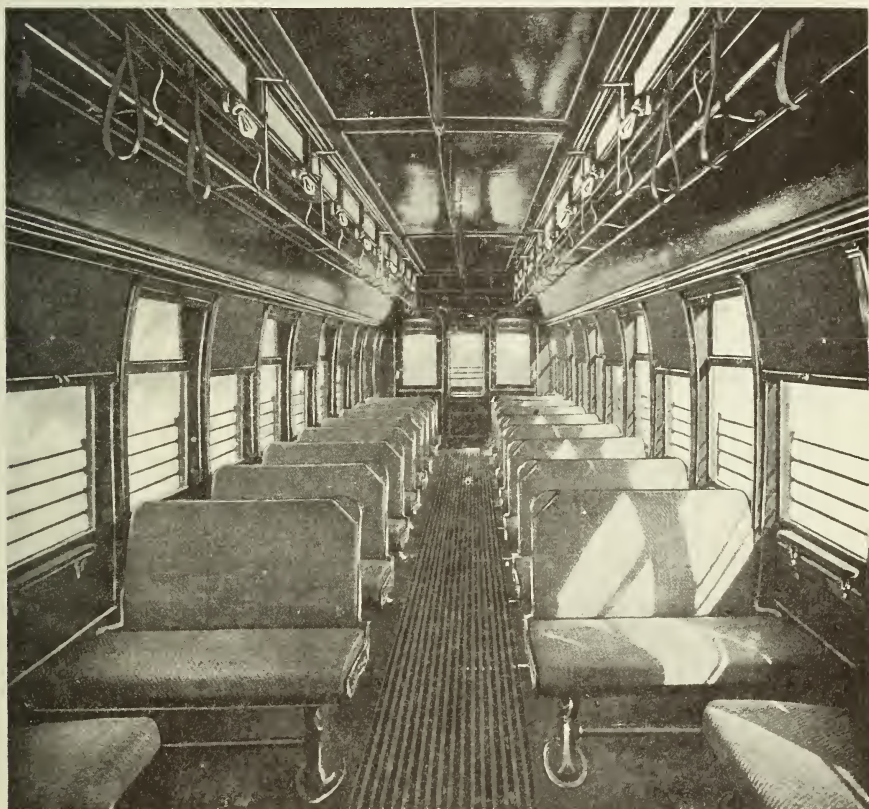
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Winnipeg Electric Railway System has 52.7 Miles of Track and Serves a Population of 140,000—The Three Inter-urban Connecting Lines Serve 24,000 of Additional Population

The cars have longitudinal seats and a single sliding door in the center of the rear bulkhead. The rear platform is of such design that the car could readily be converted for Pay-As-You Enter operation. The interior finish is quartered oak and cherry and the exterior side sheathing is cherry with natural finish in oil and varnish. The car bodies as previously stated, were built in the shops of the Winnipeg Electric Railway Company. Such features as ventilation, heating and lighting have been carefully considered from the standpoint of the public.

CARS FOR THE ROCHESTER LINES OF THE NEW YORK STATE RAILWAYS

SINGLE-END PAY-AS-YOU-ENTER EQUIPMENT

AMONG the cars recently built and delivered by the G. C. Kuhlman Car Company is a lot of 25 cars of the Pay-As-You-Enter type for the Rochester lines of the New York State Railways. These are the first new prepayment cars for that system and in general appearance and design correspond to



CARS FOR THE ROCHESTER LINES OF THE NEW YORK STATE RAILWAYS—The Equipment Combines the Pay-As-You-Enter and the Brill Patented Semi-Convertible Window Features

the previous standard equipment of the Rochester Railway Company. All of the cars are the single-end type with steam coach roof and have the Brill patented semi-convertible window system. The following is a tabular statement of the principal dimensions and features:

Length over all	44 ft. 7 in.
Length over platforms	43 ft. 5 in.
Length over corner posts	30 ft. 11 in.
Width over sills including panels	8 ft. 1 in.
Width over posts above belt rail	8 ft. 3 in.
Height inside of car from floor to ceiling	8 ft. 0 in.
Seating capacity	44 persons
Trucks—Type	Brill No. 27-FE1
Gauge	4 ft. 8½ in.
Wheel base	4 ft. 6 in.
Wheel diameter	33 in.
Wheel thread	2½ in.
Wheel flange (depth)	⅝ in.
Motors—Type	G. E. 219 Form A
Number	4 per car
Horsepower	40 each
Weight—Carbody (estimated)	20,000 lbs.
Hot water heater	800 lbs.
Air brakes	1,500 lbs.
Motors and electrical equipment	13,070 lbs.
Trucks	14,410 lbs.
<hr/>	
Total	49,780 lbs.

The underframing of the cars is, in one or two respects, somewhat unusual. The 4 by 7¾-in. continuous yellow pine side sill on the devil-strip side of each car extends the full length of the car body and the length of the platforms to the vestibule corner posts and is reinforced with a 15 by ⅜-in. steel plate. On the step entrance side of the car the sills are reinforced with 15 by ⅜-in. steel plate the length of the car body over corner posts. Each sill plate is further reinforced with 8 by ⅜-in. plate riveted to the bottom edge of the sill plate and extending from the inside of the end sill at each corner of the car to a point 3 ft. beyond the bolster. Each corner of the bottom frame is reinforced by having the end of the 8 by ⅜-in. sill plate bent at right angles to the side sill plates and extending along and bolted to the end sill for a distance of 16 in. The corners of each car on the devil-step side has a steel pocket casting, riveted to the sill plate for supporting the end sill.

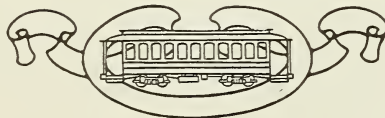
The platforms are arranged for Pay-As-You-Enter operation, the rear bulkhead being provided with two single sliding doors, each with a 25-in. opening. The front bulkhead has a 27-in. sliding door. The exit section of the rear platform is enclosed at the step by a single swing door for the protection of the conductor in severe weather. There is a single sliding front platform exit door operating in unison



CARS FOR THE ROCHESTER LINES OF THE NEW YORK STATE RAILWAYS—The Sliding Door and Folding Step at the Front Exit Operate in Unison and are Controlled by the Motorman—The Car is Mounted on Temporary Trucks for Photographing

with a folding step which is controlled by a lever placed conveniently in front and to the right of the motorman. The platforms are supported by outside knees made up of 8 by $\frac{3}{4}$ -in. steel plates reinforced with $2\frac{1}{2}$ by 8-in. oak timbers. The platform knee plates are bent to take care of the step projection and are riveted to the sill plate and the 8 by $\frac{3}{8}$ -in. sill reinforcing-plate. The inside platform knees are white oak.

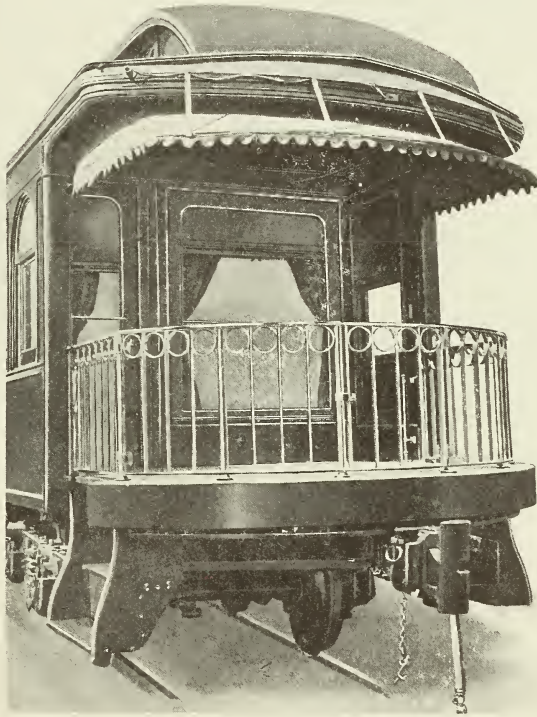
The inside finish of the cars is cherry with composition headlining $\frac{3}{16}$ -in. thick. The seats are Brill Winner upholstered in rattan.



PRIVATE CAR FOR THE ILLINOIS TRACTION SYSTEM

BUILT BY THE DANVILLE CAR COMPANY

THE handsome private car "Champaign" which has recently been delivered to the Illinois Traction System by the Danville Car Company is 40 ft. 4 in. long over end sills and 52 ft. 6 in. long over bumpers. In the length of the car there is an observation platform, an observation or main sitting room, a sleeping section, a smoking room, a toilet room, kitchen, servants' sleeping section, refrigerator, and hot water heater. The observation platform at the rear is 9 ft. long and occupies a portion of the space inside the end sill, the bulkhead being set back, leaving one window on the platform on each side of the car. The platform is fitted with ornamental brass railing with center and side gates and trap doors covering the step openings. The trap doors are fitted with brass moldings to receive heavy inlaid rubber conforming to the platform floor covering.



PRIVATE CAR FOR THE ILLINOIS TRACTION SYSTEM—The Brass Railing and Gates Enclose An Observation Platform 9 ft. Deep and 8 ft. 10 in. Wide—The Flooring is Covered With Inlaid Rubber Tiling

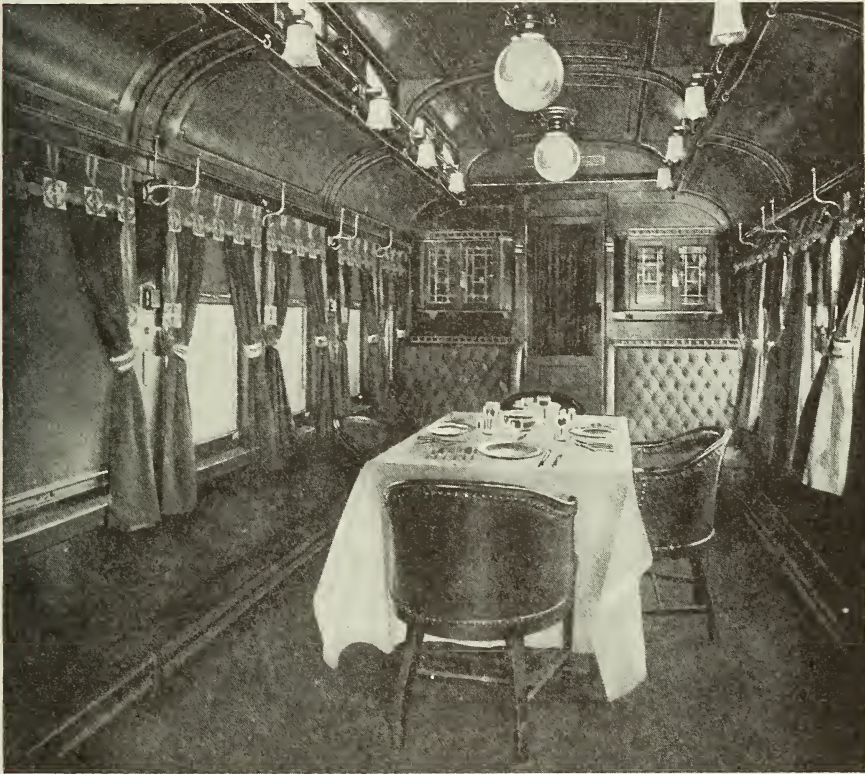
The door which opens on the observation platform from the large main or observation room of the car is placed at one side so that there is a window 4 ft. 6 in. wide in the rear bulkhead. The observation room and the car throughout is finished in solid mahogany and the ceilings are semi-empire, painted and decorated to harmonize with the interior finish. In the length, 15 ft. 10 in., of the observation room,



PRIVATE CAR FOR THE ILLINOIS TRACTION COMPANY—Interior of the Main or Observation Compartment Looking Towards the Observation Platform

provision is made for eight large comfortable chairs and against the partition which separates the observation room from the sleeping section are two upholstered "pull-out" seats which can be converted into beds when desired. Above these two seats are china cabinets with leaded glass doors. When the observation room is used as a dining room an extension folding table 6 ft. long is placed in the center of the room. The side walls are also provided with sockets and fittings for extension tables of the usual parlor car type.

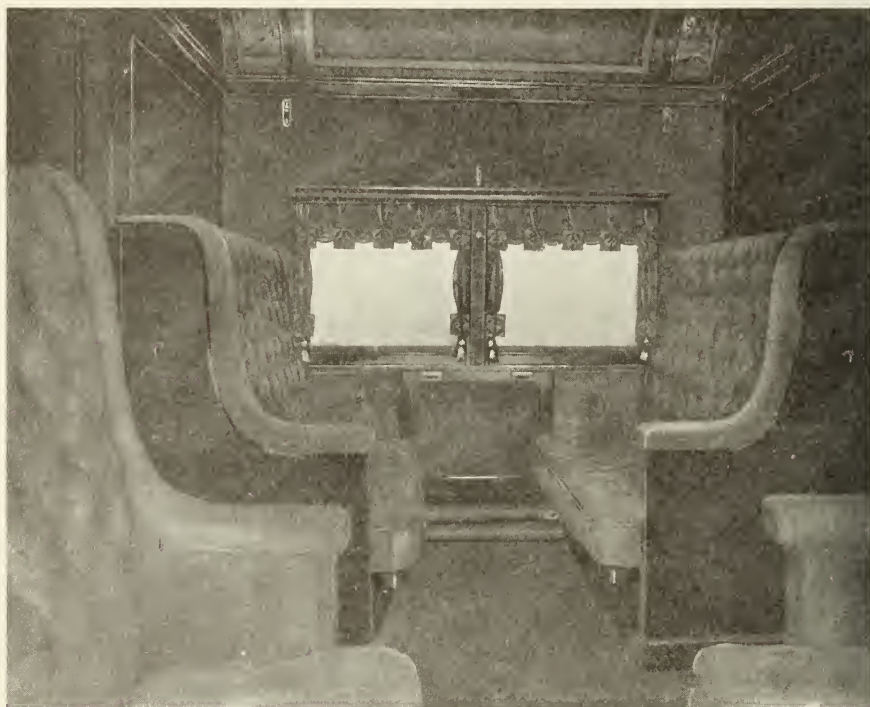
The sleeping car section, which is in the center of the car and between the observation room and the section for the smoking room and toilet room, has upper and lower berths of the National sleeping car type, storage room for the bedding being provided in boxes under the seats. The seats in the sleeping car section are handsomely upholstered



PRIVATE CAR FOR THE ILLINOIS TRACTION SYSTEM—View of the Compartment Shown on the Opposite Page Looking Towards the Center of the Car—The End Seats Pull Out to Make Up Into Berths

and deeply tufted. The section is 6 ft. 7 in. long and is separated from the rest of the car by partitions with paneled swing doors which are fitted with locks and keys. The windows are double and both sash raise. Throughout the car the windows are arranged in pairs with semi-elliptic Gothics glazed with opalescent glass, over each pair. Only the windows in the sleeping sections and in the servants' sleeping section are double.

Next to the sleeping section is a section with a smoking room on one side of the car and the toilet room on the other. This section is 6 ft. 6 in. long. The smoking room has a leather upholstered davenport placed longitudinally and arranged to pull out and form a bed. There is space below the davenport for bedding and other storage.



PRIVATE CAR FOR THE ILLINOIS TRACTION SYSTEM—The Fixed Seats in the Sleeping Sections Make Up Into Upper and Lower Berths

The entire remaining portion of the car is given over to the kitchen, servants' quarters and car heating equipment. The kitchen has a small range with coal box and provision box underneath. There is also space beside the range in which a locker for cooking utensils is placed. Opposite the range is a table covered with brass and fitted with a sink and with lockers below. Above the table and sink are shelves for dishes and cooking utensils. The refrigerator is built in the corner of the car between the kitchen and the vestibule and has

a door on the vestibule platform so that ice can be placed in the refrigerator without entering the car. There is a coil of pipes in the ice chamber connected with a small tank placed in the upper deck of the roof and arranged so that ice water can be supplied in the passageway and in the toilet room. The upper half of the refrigerator just below the ice chamber is fitted with doors so that provisions in the refrigerator may be handled from the kitchen. The lower half of the refrigerator has doors opening on the passageway. The servants' sleeping section and a large locker are on one side of the car opposite the kitchen and refrigerator.

The hot-water heater equipment is located on the front platform which is full vestibuled and has an end door. There is also a coal



PRIVATE CAR FOR THE ILLINOIS TRACTION SYSTEM—Interior of Smoking Room—The Davenport Can Be Made Up Into a Lower Berth

box on the platform. In the hoods at each end of the car are spaces to receive bedding and other material that cannot be stored in lockers or under seats. Over the passageway in the servants' section are two 5-ft. tanks for the water supply for the kitchen sink and toilet room. Over the toilet room in the upper deck is a small tank for flushing the toilet room hopper. All the tanks are arranged to be filled from the roof.

CARS FOR THE STATEN ISLAND RAPID TRANSIT RAILWAY

EQUIPMENT FOR STEAM RAILWAY SUBURBAN SERVICE

STATEN Island though located close to the mainland of New Jersey is a part of the state of New York and is virtually a suburb of New York City. Situated south-west of Manhattan it is reached from New York City by ferry and from New Jersey on the west by the lines of the Central Railroad of New Jersey. There are several electric railways on the island and the



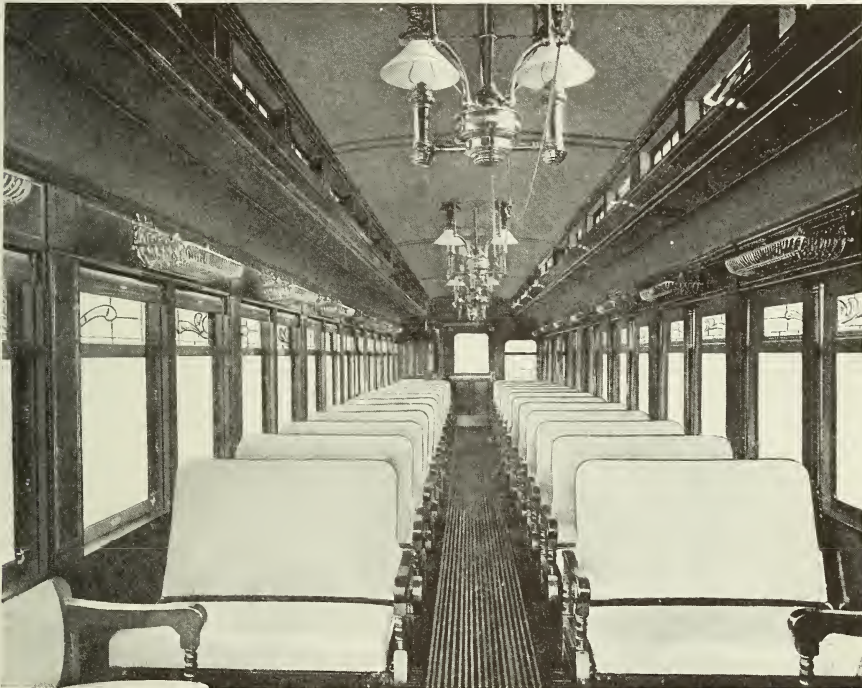
CARS FOR THE STATEN ISLAND RAPID TRANSIT RAILWAY—The Length Over End Panels is 45 ft. 6 in. and the Seating Capacity is 54 Passengers

Staten Island Rapid Transit Railway, 15 miles long, using steam locomotives, to which ten cars for passenger service have recently been delivered by the Wason Manufacturing Company.

The cars very closely resemble a type quite common in elevated service and cars of practically the same type are in not uncommon use elsewhere by steam railways on their suburban passenger lines. The distinguishing feature is the use of short open platforms slightly lower than the car floor, which are protected by an ornamental iron railing and folding gates and which are without steps. This practice has been adopted because of the tendency of passengers to ride on the platforms in summer and when the cars are crowded, and the station

platforms are built level with the platforms of the cars, to facilitate loading and unloading. In the absence of steps the cars have a step-iron on both sides of each platform.

The car bodies are 45 ft. 6 in. long and the length of each car over platforms is 51 ft. 10 in. The interior finish is inlaid mahogany. The seating arrangement with transverse seats for the full length of the car, except for short longitudinal seats at the doors, distinguish the cars



CARS FOR THE STATEN ISLAND RAPID TRANSIT RAILWAY—Mahogany Interior Finish is Used With Composition Ceilings Which Are Painted and Varnished

from those of similar type which are used in elevated service and which usually have transverse seats only at the center. The ceilings are painted composition board. Individual basket racks and two-light center oil lamps are used.

The underframing of the cars follows the generally accepted steam railway practice, the outside sills being $4\frac{1}{2}$ by 8-in. yellow pine and the center and intermediate sills of $3\frac{1}{2}$ by $7\frac{1}{8}$ -in. yellow pine. The

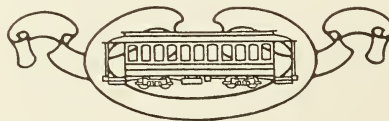
end sills and cross timbers are white oak and the truss plank yellow pine. The following was the procedure in painting the cars:

- Outside Body—2 coats primer
 - 1 coat surfacer
 - 4 coats of rough stuff, scoured and surfaced
 - 2 coats color
 - Stripe and letter
 - 3 coats varnish
- Inside—Filling
 - 1 coat shellac
 - 3 coats varnish (rub to egg shell gloss)
- Ceiling—1 coat on back
 - 3 coats color
 - 3 coats varnish (rub to egg shell gloss)
- Roof—1 coat before canvas is applied
 - 3 coats after canvas is applied
- Gates—2 coats of black
- Sheathing—Painted on back side
- Trucks—2 coats color
- Wheels—2 coats color

The cars are mounted on four-wheel M. C. B. type trucks of standard gauge and with 6-ft. wheel base, 33-in. steel tired wheels and M. C. B. standard journal boxes, journals, brake shoes, etc. The following is a statement of the dimensions of the car body:

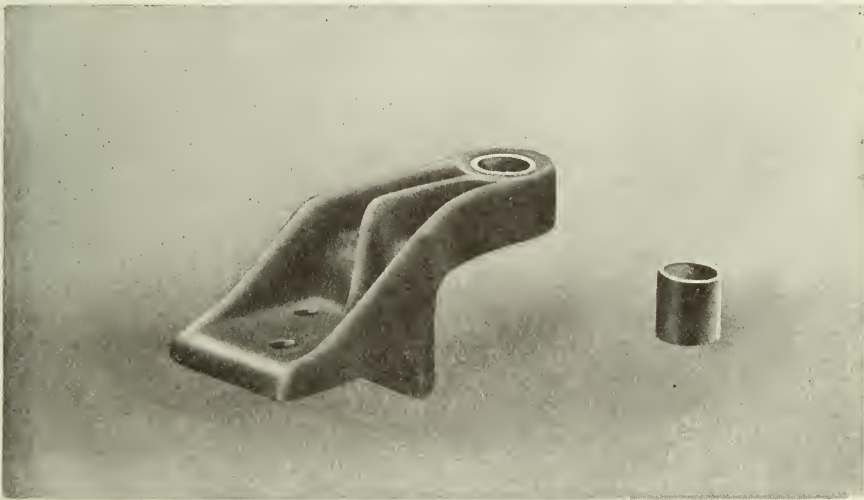
Length over end sills	45 ft. 6 in.
Length over platforms	51 ft. 10 in.
Width over sills	9 ft. 6 in.
Height from bottom of sills to top of roof	9 ft. 6 $\frac{1}{4}$ in.
Height from top of rail to center of drawbar	2 ft. 7 $\frac{3}{4}$ in.

The platforms are protected with a patented anti-climbing device.



A BRAKE RIGGING IMPROVEMENT IN BRILL TRUCK No. 21-E MAINTENANCE EXPENSE REDUCED

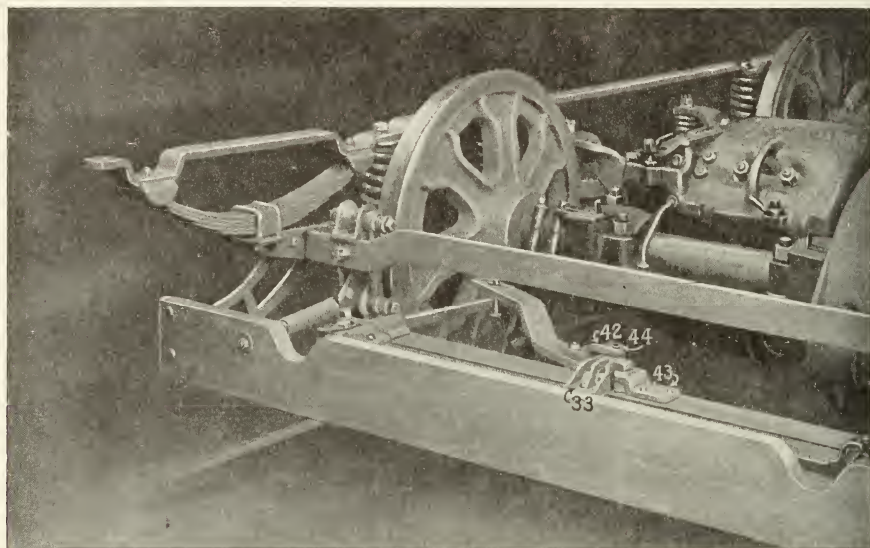
AN improvement has been made in the brake rigging of Brill Truck No. 21-E which has strengthened several parts which are subject to a large amount of wear and has accordingly reduced the maintenance and repair requirements of that truck. The parts which have been improved are the equalizing lever fulcrum, the pull lever casting, the brake beam fulcrum and the



AN IMPROVEMENT IN BRILL TRUCK No. 21-E—New Type of Equalizing Lever Fulcrum (Casting No. C-1289) With Hardened Steel Bushing—The Casting Can Be Used on all No. 21-E Trucks Now in Service

pull lever stud. An accompanying illustration shows these parts, all of which are malleable castings, and designates them by name. The equalizing lever fulcrum and the pull lever stud are the parts which are subject to the greatest wear because of the thrust upon them each time the brakes are applied. To increase the life of the stud, it is now case hardened. Heretofore when the fulcrum casting became badly worn at the stud hole, it was necessary to purchase a new casting.

Castings fitted with hardened steel bushing are now supplied on orders for the equalizing lever fulcrum casting and on all Brill No. 21-E trucks now built. In future when the equalizing lever fulcrum casting becomes worn by the use of the new type casting (C-1289) the old bushing can be removed and a new one inserted and the casting restored to its original condition at small expense. The pull lever



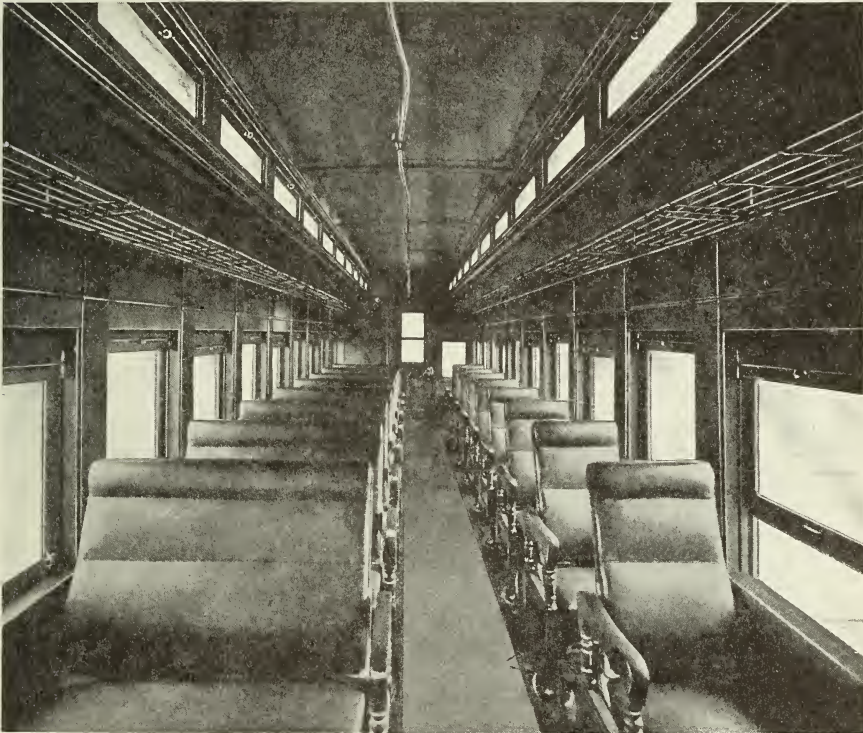
AN IMPROVEMENT IN BRILL TRUCK NO. 21-E—All of the Numbered Parts Are Case Hardened Where Subject to Wear or Otherwise Improved—The Parts Are: 33, Equalizing Lever Fulcrum Casting C-1289, Which Supersedes Casting C-3193: 42, Pull Lever Casting C-3192: 43, Brake Beam Fulcrum Casting C-3194: 44, Pull Lever Stud

casting and the brake beam fulcrum are both case hardened around the holes through which pass respectively, the pull lever stud and the bolt which attaches the pull lever to the brake beam. The pull lever is also case hardened around the bolt hole. While the case hardening at these points and the case hardening of the pull lever stud together with insertion of the bushing in the equalizing lever fulcrum casting should materially increase the life of all of the parts, it is well to bear in mind, however, that there is nothing which prolongs the life of parts, which are subjected to frictional wear, like thorough and systematic lubrication. If the wearing parts of the brake rigging of the No. 21-E truck and other trucks as well, are thoroughly oiled at regular intervals, the cost of repair parts will be reduced to a minimum.

CARS FOR THE ZACATLAN BRANCH OF THE MEXICAN RAILWAY

FIVE TYPES OF STEAM RAILWAY EQUIPMENT

A LOT of cars recently delivered to the Mexican Railway for use on a branch line which has been reconstructed include a first class passenger coach, two second class coaches, two combination first and second class coaches, two combination baggage, mail and express cars and 18 box cars. The three types of coaches are of generally similar dimensions and construction, but differ in inside arrangement and finish. The combination baggage,



CARS FOR THE ZACATLAN BRANCH OF THE MEXICAN RAILWAY—Interior of First Class Coach Which is Finished in Mahogany—In the Combination First and Second Class Cars the First Class Compartment Has Similar Arrangement and Finish



CARS FOR THE ZACATLAN BRANCH OF THE MEXICAN RAILWAY—Combination First and Second Class Coach—Except for the Designating Lettering the First Class, the Second Class and the Combination Coaches Are Alike in Exterior Appearance

mail and express cars are each 35 ft. long over sills and correspond in length to the "over sills" measurement of the other passenger cars.

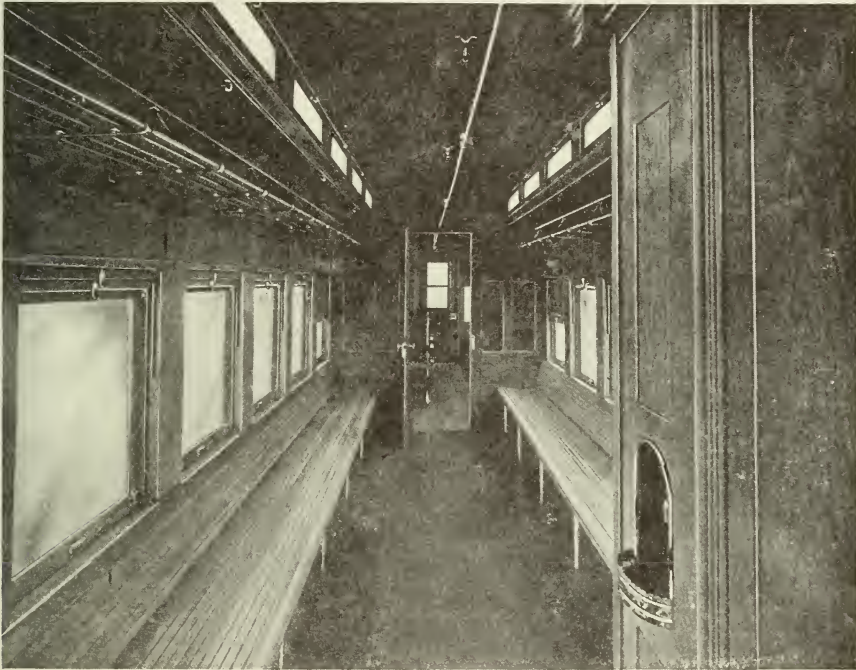
The coaches are all similar in exterior appearance, except for the distinguishing lettering on the side panelling to designate the class. The cars are painted a dark green and lettered in yellow. The first class coach has inlaid oak interior finish with varnished and rubbed surface and three-ply poplar ceilings painted green and tastefully decorated. The seats are the reversible type with high back and head roll and oak aisle arms and are upholstered in olive green leather. Owing to the fact that the cars are for service on a narrow gauge line and consequently are themselves unusually narrow, the seats are arranged with a seat for two passengers on one side of the aisle and a seat for a single passenger on the opposite side. The windows are



CARS FOR THE ZACATLAN BRANCH OF THE MEXICAN RAILWAY—Combination Baggage Express and Mail Car—The Mail Compartment Occupies Only 12 ft. of the Total Length Which is 35 ft.

provided with Pantasote curtains with spring rollers and pinch fixtures. There are continuous basket racks. A saloon with dry hopper is placed in one end of the car and is large enough for the installation of an acetylene generator for car lighting in addition to the usual water cooler with faucet in the car aisle.

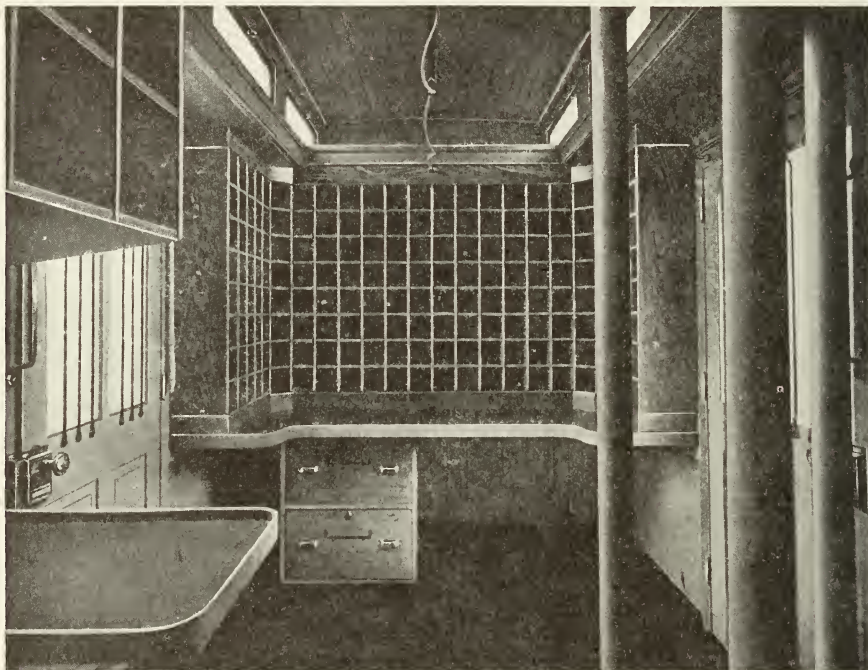
The second class coaches have narrow ash sheathing interior finish, including the ceiling, all of which is varnished and left in the gloss.



CARS FOR THE ZACATLAN BRANCH OF THE MEXICAN RAILWAY—The Second Class Cars Are Finished in Ash Which is Varnished and Left in the Gloss

Longitudinal ash slat seats are used and the continuous basket racks are made from ash slats and have malleable brackets. Blinds are used instead of curtains. The combination cars combine in the respective compartments the features of the first class and of the second class cars. There is a saloon in each compartment, the one in the second class section being large enough to accommodate an acetylene lighting generator. The baggage or mail car is sheathed on the inside with pine. There are doors on each side of both compartments, those in the bag-

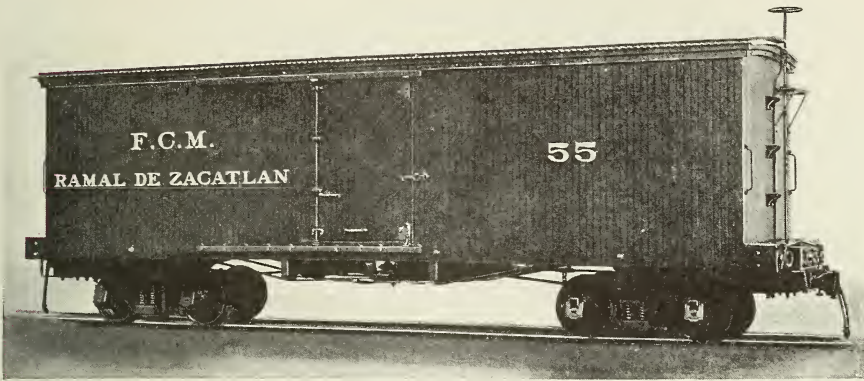
gage compartment being of the sliding variety and the doors in the mail compartment being hinged. The mail compartment, which is only 12 ft. long, is fitted with letter cases, mail bag racks and tables to conform to the United States Government standard. The baggage compartment has a desk with pigeon holes above it.



CARS FOR THE ZACATLAN BRANCH OF THE MEXICAN RAILWAY—The Mail Cars Have United States Government Standard Appurtenances

All four types of cars have framing of a uniform type, the side sills being $4\frac{1}{2}$ by 8-in. yellow pine and the center and intermediate sills $3\frac{1}{2}$ by 8-in. yellow pine. Truss rods $1\frac{1}{2}$ -in. in diameter are used under the side sills and the 6 by 7-in. cross ties are trussed with $\frac{3}{4}$ -in. rods. The body bolsters are two 8 by 1-in. steel plates with cast iron filler over the side bearings and in the center. The following dimensions apply to all cars:

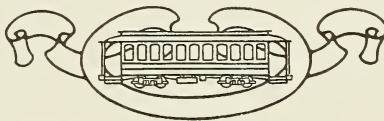
Length over sills	35 ft. 0 in.
Width over sills	7 ft. 6 in.
Height over roof boards	11 ft. 0 in.



CARS FOR THE ZACATLAN BRANCH OF THE MEXICAN RAILWAY—One of the Eighteen 30 ft. Box Cars With Corrugated Iron Roof

The trucks are for 2-ft. 6-in. gauge track and are the four-wheel type with side bearings carried out beyond the frame of the truck so as to give the widest possible bearing and insure easy riding qualities.

The box cars are 30 ft. long and 7 ft. wide over sills and have corrugated iron roofs. The underframing comprises 5 by 8-in. long leaf pine side sills, 4 by 8-in. intermediate sills and 5 by 8-in. center sills. The end sills are 6 by 9-in. oak. The body framing includes $4\frac{1}{4}$ by $4\frac{1}{4}$ -in. door posts, 4 by $4\frac{1}{2}$ -in. corner posts and $2\frac{1}{2}$ by 4-in. side posts, four to the side of each car. The flooring is $1\frac{3}{4}$ -in. matched yellow pine and the interior of each car is lined up to the belt with $\frac{13}{16}$ -in. yellow pine. The outside sheathing is $\frac{13}{16}$ -in. pine $3\frac{1}{4}$ wide.



PAY-AS-YOU-ENTER CARS FOR THE ILLINOIS TRACTION SYSTEM EQUIPMENT FOR OPERATION OVER THE McKINLEY BRIDGE

THIRTY cars recently delivered to the Illinois Traction System by the American Car Company form the initial equipment for service over the new McKinley Bridge across the Mississippi River above St. Louis. Twenty of the cars are motor cars of the Pay-As-You-Enter type mounted on Brill No. 27-M. C. B. 2 trucks and the other ten are cars of the same type for trail service. The trail cars have the same dimensions as the



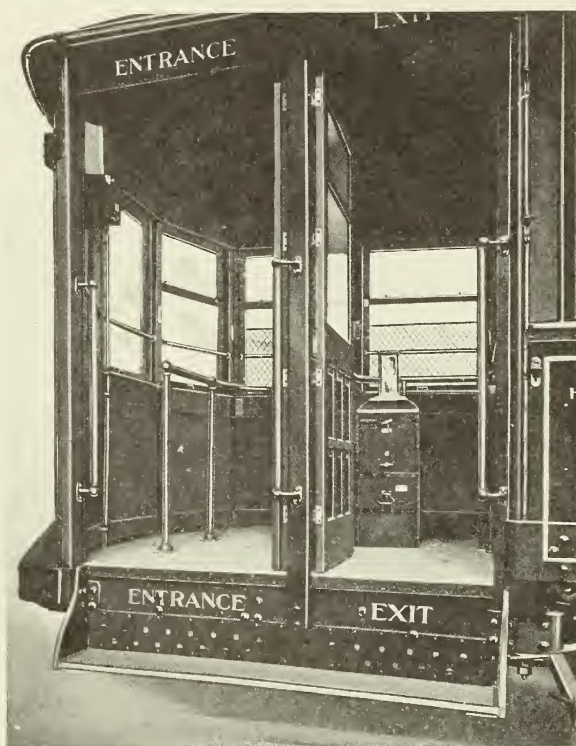
PAY-AS-YOU-ENTER CARS FOR THE ILLINOIS TRACTION SYSTEM—One of the Motor Cars Mounted on Brill No. 27-M. C. B. 2 Trucks

motor cars and are the same in every respect, except that the platform arrangement on the rear of the trail cars is the same as the front platform on the motor car and the Pay-As-You-Enter feature of the trail cars is embodied in the front platform instead of the rear.

Both motor and trail cars are the single-end type with full vestibules at both ends. The rear platform of the motor car and the front platform of the trail car is provided with doors for winter and gates for summer. The cars have straight sides and straight topped window sash which are made in two parts, both in the body of the cars and in the vestibules, except the center end vestibule sash. The cars are sheathed on the outside with $\frac{1}{8}$ -in. matched yellow pine boards and

over this sheathing is placed a sheathing of No. 14 sheet steel. Where the steel siding terminates just below the window sill joint it is covered by an iron molding $1\frac{3}{4}$ by $\frac{1}{4}$ -in. extending the full length of the car body in one piece.

The rear vestibule of the motor car and the front vestibule of the trail car has standard Pay - As - You - Enter features. The railings are arranged with vertical members running through the floor and secured to the platform knees. Both the folding doors for use in winter and the folding gates for summer operation are operated by the conductor without leaving his usual position. The front vestibule has two sliding doors entering the end of the car and one slid-

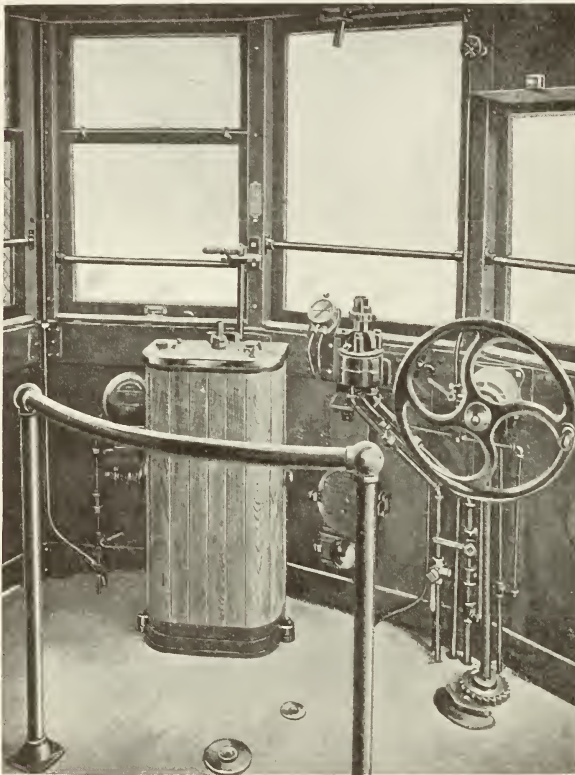


PAY-AS-YOU-ENTER CARS FOR THE ILLINOIS TRACTION SYSTEM—
Rear Platform Showing the Brill Fare Box and the Rail
Behind Which Smokers Are Allowed to Stand

ing exit door at the right hand corner of the vestibule. There is a railing protecting the motorman from interference from passengers and the sliding exit door is under the control of the motorman.

The interior finish of the cars is mahogany with three-ply poplar veneer headlining and ceilings. There are 16 transverse seats, upholstered in rattan, which have stationary backs with brass corner grab handles. These seats are 37-in. long and the aisle width is $27\frac{1}{4}$ in. There are two longitudinal seats each 7 ft. 6 in. long. The lower portion of each window sash drops into a pocket, the upper half is fixed.

The principal members of the underframing are the four sills. The side sills consist of two pieces of long leaf yellow pine filled in between with an 18 by $\frac{3}{8}$ -in. plate the full length of the car body and bent at right angles at the end sill and securely bolted to the end sill.



PAY-AS-YOU-ENTER CARS FOR THE ILLINOIS TRACTION SYSTEM—
Interior of Front Motor Car Platform—The Handle Above
the Controller Box Operates the Sliding Door
and Folding Step of the Front Exit

The outer member of the side sill is $4\frac{1}{16}$ by 8-in. and the inner member is $2\frac{3}{4}$ by $7\frac{1}{8}$ -in. This composite sill is bolted together independently of tie rod bolts and angle iron bolts. The center sills consist of 6-in. I-beams, $12\frac{1}{4}$ lb. per ft., which are filled in on each side with $2\frac{3}{8}$ by $6\frac{3}{16}$ -in. long leaf yellow pine. The fillers rise $\frac{3}{16}$ -in. above the top flange of the I-beam to make up the bottom framing member at the end sills and to provide nailing strips for the floor. The cross framing consists of $3\frac{1}{2}$ by $6\frac{3}{16}$ oak

tenoned into the center sills and side sill fillers. At each crossing there are two $1\frac{3}{4}$ -in. tie rods, one on each side, with the heads countersunk in the side sill under the sheathing and the other end of the rod terminating in a malleable iron casting between the center sills. In addition, the cross framing is secured to the side sills by 4 by $\frac{1}{2}$ -in. angle irons. The platform framing consists of 6-in. Z-bars reinforced at the turn with gusset plates. The Z-bars are filled under the plat-

form with oak fillers and are snugly fitted to the center sills and extend back beyond the bolster plate. The outside knees consist of 3-in. oak plated with 12 by ½-in. steel plates. The following are a few dimensions of the cars:

Length over bumpers	50 ft.
Length over vestibules	48 ft. 8 in.
Length over end panels	33 ft. 8 in.
Width over sheathing	9 ft. 3 in.
Height from top of rail to roof	12 ft. 1 in.
Truck centers	21 ft. 0 in.



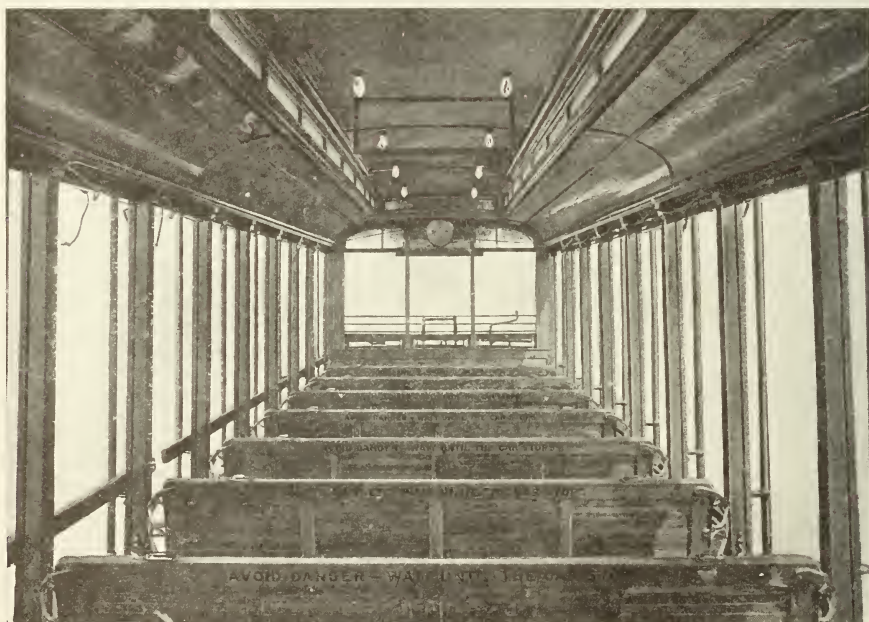
PAY-AS-YOU-ENTER CARS FOR THE ILLINOIS TRACTION SYSTEM—The Interior Finish is Mahogany With Poplar Veneer Ceilings—The Aisle Has Interlocking Rubber Tiling Floor

The cars are heated with 22 electric heaters, one heater being placed under each transverse seat, two heaters under each longitudinal seat and one heater in each vestibule. There is a push button signal system and each car is equipped with six destination signs. There are four stationary signs made of glass set in wood frames, one at each end and one at each side of the upper deck. At each right hand corner of the car there is a roller destination sign.

SUMMER EQUIPMENT FOR THE BOSTON & NORTHERN STREET RAILWAY

FOURTEEN-BENCH OPEN CARS

THIRTY-TWO 14-bench open cars have recently been delivered to the Boston & Northern Street Railway by the John Stephenson Company and eight 12-bench cars of the same type are now being completed. The 14-bench cars, one of which is shown in an accompanying engraving, have the steam



SUMMER EQUIPMENT FOR THE BOSTON & NORTHERN STREET RAILWAY—There Are Two Fixed Seats Against Each Bulkhead Which Has Drop Sash

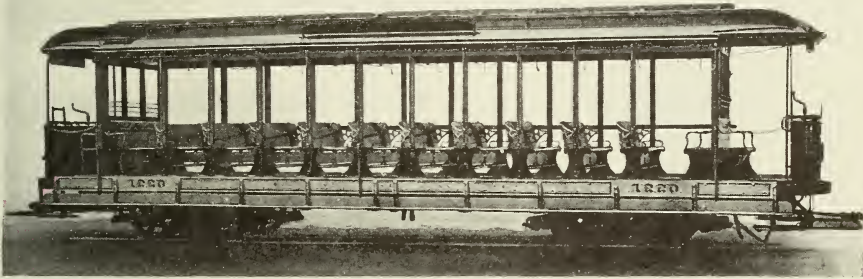
coach type of roof and ten reversible seats, two fixed seats being placed against each bulkhead.

The following are the principal dimensions of the cars:

Length over bumpers 40 ft. 10½ in.
Length from center to center of corner posts 30 ft. 10½ in.

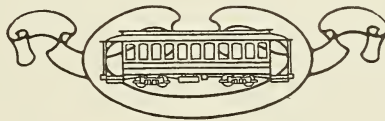
Width over sills, including sill plates	7 ft. 5 in.
Width of car over running board	9 ft. 0 in.
Height from rail to top of trolley board	11 ft. 5 in.

In a car of this type in which the platforms are level with the floor of the car body there are no great difficulties in the design of the under-frame. In this case the side sills are southern pine $3\frac{3}{4}$ by $7\frac{3}{4}$ -in. and plated with 9 by $\frac{3}{4}$ -in. steel plates. The center sills are $2\frac{3}{4}$ by $4\frac{1}{2}$ -in.



SUMMER EQUIPMENT FOR THE BOSTON & NORTHERN STREET RAILWAY—Fourteen-Bench Car—The John Stephenson Company Has Also Built Eight Twelve-Bench Cars for the Same Railway

and extend from crownpiece to crownpiece, the latter members being oak, $2\frac{3}{4}$ by $21\frac{3}{4}$ -in. The crossings are 4 by 6-in. oak. The bolsters consist of two plates, the top member of which is 9 by $\frac{3}{4}$ -in. wrought iron and the bottom member 9 by $\frac{7}{8}$ -in. mild steel. The posts and interior finish of the cars is ash and the ceilings are 3-ply birch veneer. The cars have Brill patented round corner seat end panels and the other special equipment includes Brill-Hovey draw bars, Dumpit sand boxes, Dedenda gongs.



BRILL MAGAZINE

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ABOUT fifty per cent. of the electric railways of the United States change master mechanics at least once a year. This somewhat startling fact has been brought to light by a systematic checking and constant revision of the mailing list of Brill Magazine. Now, inasmuch as the master mechanic has charge of the maintenance of rolling stock, its repair in case of wrecks, its periodic rehabilitation or general overhauling and is frequently the advisory head in preparing specifications for rolling stock to be purchased, it is neither surprising that most rolling stock is poorly maintained, nor that nearly every road has a variety of standards and types of equipment which rivals in diversity the colors of Joseph's spotted coat. The upkeep of a large portion of the rolling stock in service is on a hand to mouth basis both because the higher officials endeavor to reduce expenses in the mechanical department by keeping a tight

rein on the expenditures of the master mechanic and because master mechanics as a class are not professionally railway master mechanics and accordingly do not understand by experience or study, real railway rolling stock maintenance. Another phase of the matter is that the present class of master mechanics on many electric railways have no intention or expectation of holding their position for more than a few months and such work as they do is done to make the best showing at the least expense. There are some notable exceptions to this general condition and it may be said that the larger city systems have quite generally learned the economy of a permanent staff of high-class rolling stock mechanics in charge of an expert superintendent of rolling stock. In some respects the frequency with which the other roads change master mechanics indicates a restless desire for something better, but after all the real solution of the trouble and the real economy will come through better men, trained men and organization.



ORGANIZATION is as great a need of the majority of electric railways as is co-operation the need of the electric railway field in general. There are quite a large number of roads which could obtain financial salvation without co-operation, or assistance from other roads, provided

their own organization were perfected. Consider the successful roads individually and you will find that a large number of them have a highly perfected organization. Has it occurred to you that success has been attained by organization and not that organization, which outwardly is typified by a lot of high salaried men, is possible because of financial success? In this connection the following significant paragraph appears in the chapter on the strength and weakness of existing systems of organization of Harrington Emerson's "Efficiency." Mr. Emerson is qualified as an authority by reason of his practically successful demonstration of his theories in a variety of instances and conspicuously in the shop organization of the Sante Fe Railroad. The paragraph reads: "The ten-million-dollar and upwards company ought to be able to supplement every dollar-a-day worker with a two-hundred-thousand-dollars-a-year staff of assistants, thereby making the worker four times as effective and gaining a crushing advantage over the smaller concern which cannot afford the same aggregation of specialized knowledge. The great concerns, however, have conspicuously failed to develop this advantage, even if they do have a large staff of experts—a very different thing from a staff organization which gives the least worker the needed direction, stimulus and advice. A two-hundred-thousand-dollar staff for a dollar-a-day man is neither utopian nor expensive. On the con-

trary it is to the highest degree economical, if almost infinitesimal attention from a very high-priced man will make, as to his specialty, one thousand or twenty thousand low-priced men four times as effective." Elsewhere in his book Mr. Emerson intimates that the problems of organization for efficiency are as largely the problems of securing a high class personnel for an organization as they are in perfecting the organization. But there is not a single intimation that a "two-hundred-thousand-dollars-a-year staff of assistants" can be found among men who can be hired for one hundred or two hundred dollars a month. A "two-hundred-thousand-dollars-a-year staff" is made up of men who receive and can earn ten thousand to fifty thousand dollars a year. And there comes the rub. The average board of directors will strain at a gnat and swallow a camel before allowing themselves the economy of really high-class men. Though every electric railway is not a ten-million-dollar concern, the principle is applicable to all.



THE average car built for city service is now 28 ft. to 30 ft. long over end panels instead of 30 ft. to 34 ft. long as was the case only two or three years ago. Doubtless there have been various factors to cause this change, among them the almost uni-

versal desire for cars with pay-as-you-enter platforms which preferably are slightly longer than the average platform in prior use. Another factor has doubtless been the public demand for "more cars and better service" which has necessitated a greater number of car units with shorter intervals between cars as much as an increase in the actual gross car carrying capacity. But as nearly as can be determined, the one factor which has had the greatest influence in reducing the length of the body of the average city car has been the demand for lighter cars and equipment. As a result of this demand it has been possible to readily build a car with a body 28 ft. to 30 ft. long, or even slightly longer, which does not weigh more than 7 to 11 tons. A car of this weight can be operated by two motors and can be mounted on single motor trucks. Both trucks and motors weigh less than the corresponding portion of a four-motor equipment. Thus by a slight saving in the weight of the car body, a comparatively large total saving has been obtained. In securing this reduction, the most apparent saving in weight has been by reducing the size of the car and some car builders have secured a further reduction by arbitrarily reducing some of the dimensions of various members of the

car framing. This has been possible because following the demand for "large and substantial" cars there was lavish use of material without consideration of the actual size and strength required, with the result that both the weight and the factor of safety of many of the parts was much higher than necessary. It may fairly be said that this excess weight has been disposed of in recent designs—though in a more or less hit or miss fashion—by the majority of the car builders. Most of them do not yet know where the "weight" of the car body lies, whether in the framing, the fittings, the finish, or in a combination of all. Much less does he know whether certain members represent the actual requirements in weight or otherwise. The intelligent study of those features requires a mass of material to work with, such as the weights of a large number of car bodies, and the weight of their trucks, motor and other equipment, as well as detailed weights of the various parts. Fortunately, we have had access to figures of that sort and some definite conclusions have already been drawn. The tangible results of those conclusions will be set forth in the design of a light-weight car which will be presented in an early number of Brill Magazine.



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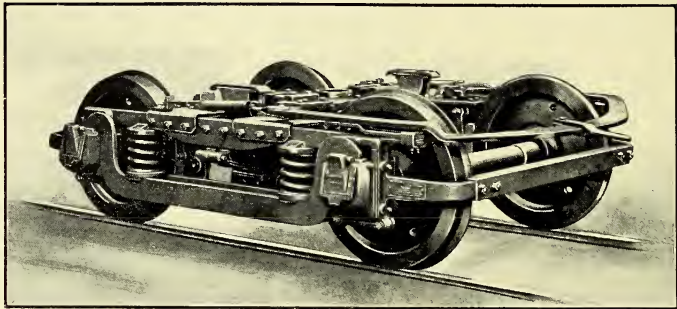
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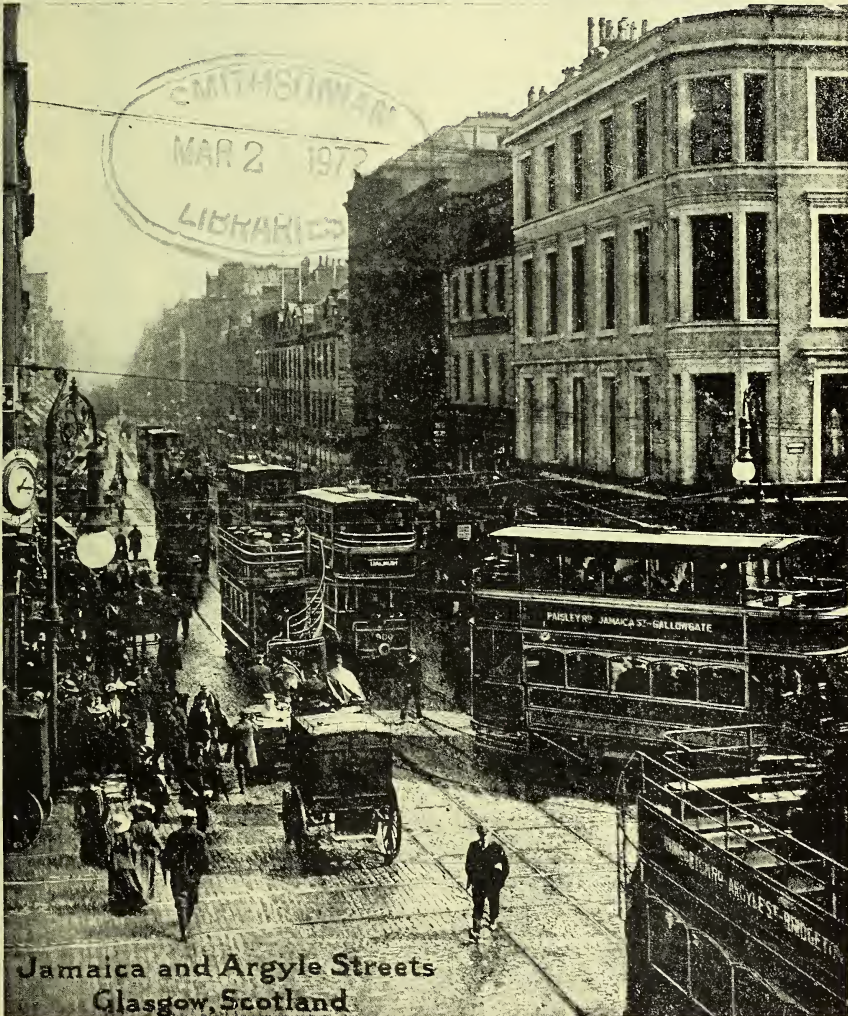


THE BRILL No. 27-M. C. B. TRUCK

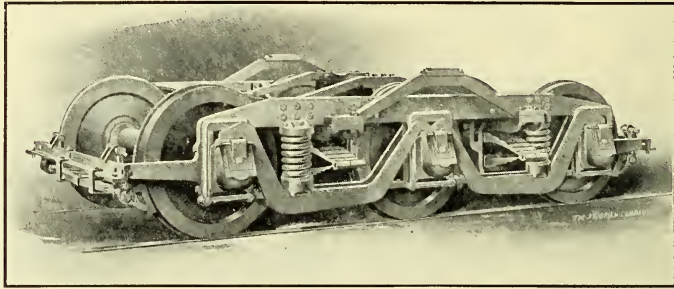
The one-piece solid forged side frames which are a fundamental feature of the Brill No. 27-M. C. B. truck secure greatest strength where it is most needed and make possible a transom, tie-bar and end cross-axle construction which insures permanent squareness and rigidity of the entire truck frame. Aside from the manner in which the No. 27-M. C. B. meets those elemental requirements for long continued good service at minimum expense for maintenance, the construction of the brake-rigging and its accessibility for repairs are features which should not be overlooked.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE



Jamaica and Argyle Streets
Glasgow, Scotland



BRILL No. 27-M. C. B. SIX-WHEEL TRUCK

The wheel piece and pedestals of the Brill No. 27-M. C. B. truck are comprised in one solid forging. The mild steel from which this forging is made is shaped under hydraulic pressure of 3,000 to 4,000 tons insuring a uniform structure throughout the metal and at the same time "working it down" to a density which, together with a very thorough annealing process, renders it proof against crystallization. The character of the frame and its form are superior to riveted and built-up constructions with their multiplicity of parts, and to castings with their liability to hidden blow holes, porous sections and crystallization. There is practically no deterioration in a truck frame like that of the Brill No. 27-M. C. B. six-wheel truck.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



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BRILL MAGAZINE

Vol. IV

JUNE, 1910

No. 6

THOMAS E. MITTEN

[WITH PORTRAIT INSERT]

THOMAS E. MITTEN, president of the Chicago City Railway Company was born March 31, 1865 at Brighton, Sussex, England. When he was twelve years old his father with a family of eight came to America and settled on a small farm in Newton County, Ind., and from that time until he was nineteen, Thomas remained on the farm, devoting his spare moments to telegraphy in the local freight office of the Chicago & Eastern Illinois Railroad at Goodland. In 1885 he secured a position as station agent at Wyndham, Ind., now called Swanington where his office was in a freight car which also served as bed-room and dining-room. In 1887 he was made local agent at Attica, Ind., then the chief station on the branch and remained there until 1890, when, his health breaking down he went west but continued in railroad work. In 1893 Mr. Mitten went to the Denver & Golden Railroad, a short steam suburban line running from Denver to the coal mines in the foot hills at Golden and while he was in charge portions of the road were electrified. In 1896 he turned eastward and became associated with the electric lines of Milwaukee, Wisconsin, first as assistant superintendent and later as general superintendent. The road was in the throes of labor agitation at the time, the trouble culminating in a strike, and Mr. Mitten here earned a lasting reputation for the tact, firmness and impartiality which he displayed in settling the dispute. In 1901, he left Milwaukee to accept the position of general superintendent of the street railway system at Buffalo, N. Y., operated by the International Railway Company. This was just prior to the Pan-American Exposition and so successfully did Mr. Mitten solve the complex traffic and operating problems of the Pan-American period, that after the close of the Exposition he was made general manager of the system. In 1905 he was called to Chicago to become president of the Chicago City Railway Company, which position he now holds.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

GLASGOW, SCOTLAND

NO more striking example could be found of one of the principal differences between operating conditions in Continental cities and cities in America than by a comparison of the scene shown on the front cover of this issue of Brill Magazine with the scene shown on the cover of the May number. Main Street, Winnipeg, in width is possibly an exaggeration of the average American street and certainly the scene is not typical of the volume of vehicular and pedestrian traffic to be found



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—With Seats for 62 Passengers the Standard Glasgow Car Weighs Only 20,720 lb. or 335 lb. per Passenger—The Car Body is Mounted on a Brill No. 21-E Truck

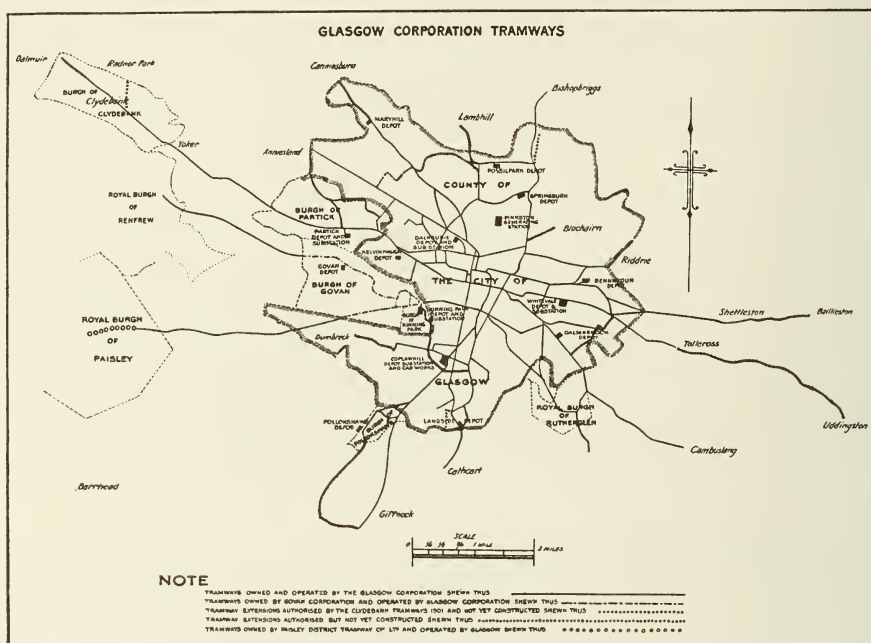
either in Winnipeg or other cities in America; but compared with the Glasgow street scene shown this month it does unquestionably exemplify one factor which has been prominent in making the Continental car as a class much shorter than the average American city car, namely the street width.

In the British Isles the need of a short car combined with other conditions such as a climate which is without extremes of heat or cold and a demand for great carrying, and more particularly seating capacity, has resulted in the top-seat or double-deck car. While this car has appeared at some time or other in nearly every country where there are electric railway systems of any extent, it is characteristically a British type. The type, the standard of the Glasgow Corporation Tramways, as used by that corporation has the following dimensions and features:

Length over end panels	17 ft. 0 in.
Length over platforms	29 ft. 0 in.
Length over all	29 ft. 6 in.
Width over sills	6 ft. 0 in.
Extreme width	6 ft. 9 in.
Weight	
Carbody	10,080 lb.
Motors and electrical equipment	5,600 lb.
Trucks	5,040 lb.
Total	20,720 lb.
Trucks	Brill No. 21-E

The Glasgow Corporation Tramways has 801 cars and is building 50 additional cars. With the exception of 80 bodies bought from car builders, all of the equipment was built at the Coplawhill car works of the corporation. Of the total number of cars in service 600 are mounted on Brill No. 21-E trucks, which is probably better adapted than any other truck for service under double-deck cars because it carries the car body lower.

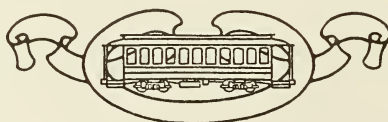
The use of the double deck car is Glasgow and elsewhere has recently shown a new phase. The roof seats which for a considerable period have been unprotected are being equipped with roof covers, the purpose according to reports being to obtain a paying load on the upper deck in wet or cold weather. Thus equipped, the seating capacity of the Glasgow cars is 62 passengers, at the weight given above, which is possibly a trifle low for a car with top roof, the weight



**CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Glasgow Corporation Tramways Enjoy an Operating Monopoly But a Portion of the Property is Leased
 There are 189.5 Miles of Track**

per seated passenger is only 335 pounds per passenger, a figure which it is believed cannot be approached by any "standard" car in service in the United States.

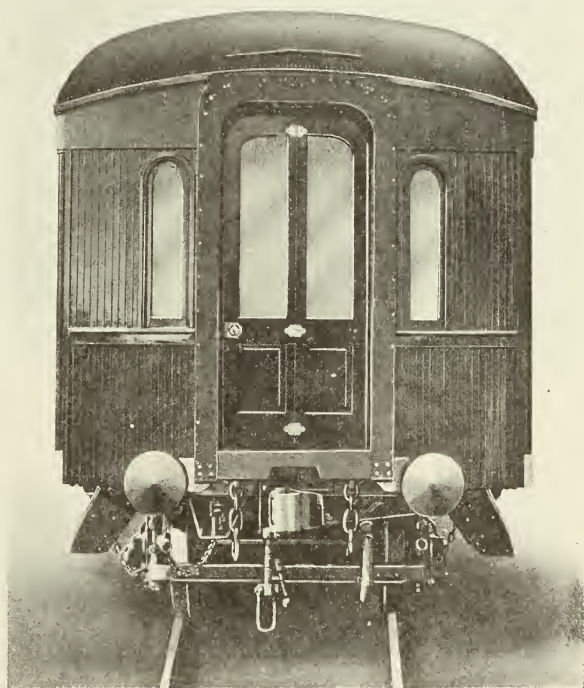
The population of Glasgow is 802,000, all of which is served by the Glasgow Corporation Tramways. In addition 248,000 suburban population is served. The corporation has 189.5 miles of track.



STEAM CARS FOR THE INTERNATIONAL RAILWAY AND TRANSPORTATION EXPOSITION OF ARGENTINA

EQUIPMENT FOR THE CENTRAL BUENOS AIRES RAILROAD

THE Central Buenos Aires Railroad now serves one of the most populous and richest agricultural sections of Argentina and has more than 150 miles of road. The system is the outgrowth of the horse tramway system of Buenos Aires of which Federico Lacroze was the pioneer builder. The road was first built as an extension to the city system from the earnings of the latter and upon it horse cars were operated for the transportation of passengers and freight. The line was 60 to 70 miles in length and traversed what was then a sparsely settled country. On this line was operated one of the most interesting cars ever built—a horse car equipped as a sleeper with four upper and four lower berths of steam car character. The car was built by The J. G. Brill Company in 1886.



STEAM CARS FOR ARGENTINA—The Cars Are All Full-Vestibuled and Have M. C. B. Drawbar Heads



STEAM CARS FOR ARGENTINA—Exterior of First-Class Coach—The Second-Class Cars are the Same in General Exterior Appearance

Another of the Brill Companies, the Wason Manufacturing Company, has recently completed the latest equipment for the road comprising a full train of cars which will be on exhibition at the International Railway and Transportation Exposition to be held at Buenos Aires from May to October of the present year. There is a first class coach, two second class coaches, a baggage and mail car and a dining car, all of which are vestibuled and are of the same general outline and general dimensions. The accompanying engravings show both the exterior and the interior of the several types of equipment. The following tabular statement covers the general dimensions of all of the cars:

Length of body	55 ft. 8 in.
Length over platforms	60 ft. 6 $\frac{1}{8}$ in.
Length over side buffers (extreme)	63 ft. 7 $\frac{7}{8}$ in.
Width over sills and sheathing	10 ft. 0 in.
Height from top and rail to top of roof	13 ft. 6 in.
Centers of trucks	43 ft. 0 in.



STEAM CARS FOR ARGENTINA—Baggage and Mail Car Mounted on Brill No. 27-E2 Trucks—The Other Cars Are Also Mounted on Brill High Speed Trucks of the Same Type

The cars have a composite steel and oak underframe construction. The side sills are 8-in. steel channels, the center and intermediate sills 8-in. steel beams and the buffer 10-in. steel channels. All the members are accurately machined to fit together and are secured in place by steel gusset plates and forged and rolled steel angles. The platform crownpiece has an open hearth steel casting in the center, joining the



STEAM CARS FOR ARGENTINA—The First-Class Coach is Divided Into a Compartment for Smokers And One for Non-Smokers—The Floor is Covered With Linoleum and Heavy Cocoa Mats Are Used in the Aisle

auxiliary buffer timber. The casting is of such shape as to form a recess for the drawbar in order to reduce the opening between the platforms when the coaches are coupled. The top of this opening between cars is fitted with a steel cover plate so as to provide a continuous platform. The body bolsters are rolled plates 10 by 1 in., the top of wrought iron and the bottom soft steel. The needle beams are 8 in. steel sections spaced 11 ft. apart. The truss rods are $1\frac{1}{2}$ in. in diameter.

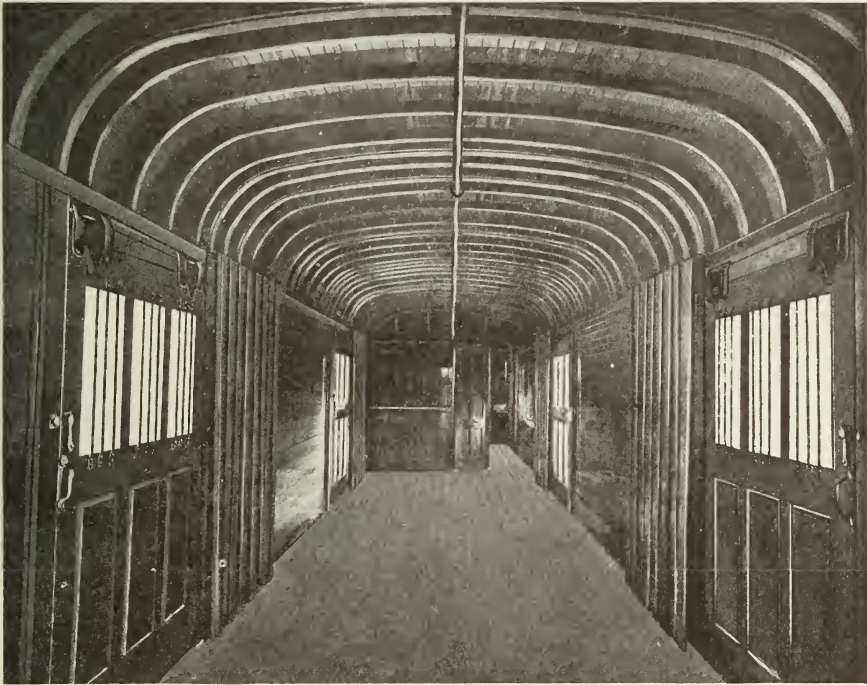
The frame of the car body including the auxiliary sills, truss plank, side plates, posts, belting and braces is Southern pine. The letter boards, corner and door post faces, battens, fascia and crown molding are white pine. The side and end posts are of compound construction with the inner faces grooved out for $\frac{3}{4}$ -in. vertical tie rods and are tenoned into the sill and plate and are gained out for belting and block-



STEAM CARS FOR ARGENTINA—The Second-Class Coaches Have Dark Oak Interior Finish—The Seats Are Reversible

ing. The ends of the car are reinforced with 3 by $\frac{5}{8}$ -in. steel plates sandwiched between the end posts and bolted thereto, the lower ends of these plates being attached to the end sill and the upper ends bolted to a steel angle extending from side plate to side plate of each car to provide an anti-telescoping construction. Under each window braces are fitted, which have their lower ends cut at an angle to give equal area to sill and posts and their upper ends fitted to hook rods extend-

ing through the sill. The sides and ends of the body frame are blocked from top of sill to the bottom of the plate with $\frac{3}{4}$ -in. pine blocking. The outside sheathing of the cars is $\frac{3}{4}$ -in. tongue and grooved white pine which is stained the color of the teak. The windows are arranged in pairs with oval Gothic sash surmounting each pair. The



STEAM CARS FOR ARGENTINA—Interior of Baggage Compartment of Baggage and Mail Car—The Mail Compartment Has the Usual Features for Mail Distribution

top sash is stationery and the lower one movable and made of steel and fitted with automatic balance. The cars are full vestibuled.

The first class coach has natural oak interior finish without carving, but the marquetry of Colonial design. The ceiling is composition painted ivory white and decorated. The car is divided into two compartments for smokers and non-smokers. The partition between compartments has a double swing door, which like the doors at both ends of the car has a panelled lower portion and an upper portion fitted with plate glass, bevelled and polished and with the railroad company's

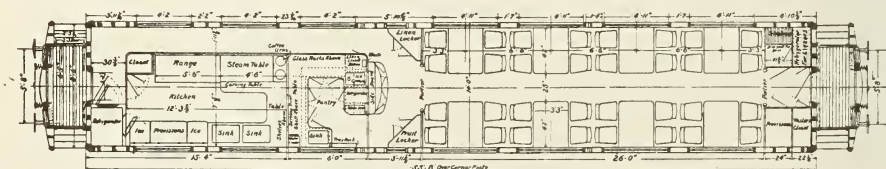


STEAM CARS FOR ARGENTINA—Exterior of the Dining Car Which is Built on the Same General Lines As the Other Cars in the Train and Mounted on Brill No. 27-E2 Trucks

monogram ground on it. The seats are reversible and have steel pedestals and rails. They are upholstered in hand-buffed green Spanish leather. Bronze basket racks are provided over each pair of windows. The floor is covered with linoleum. There is a saloon with wet hopper. The inner walls of the saloon are covered to a height of four feet with metallic tile. Opposite the saloon is a lavatory which is fitted with porcelain washstand, ice water tank, mirror, tumbler, and brush and comb holders and coat and hat hooks. The floor of the lavatory and of the saloon is covered with sheet lead.

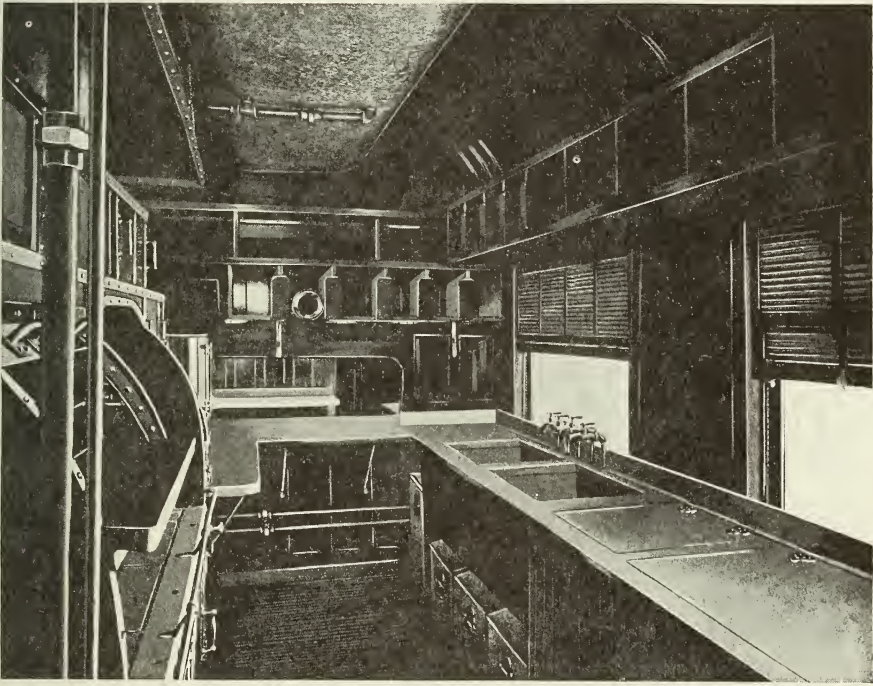
The second class coaches have dark oak interior finish and reversible wood slat seats. There is only one compartment and the car is without toilet facilities or a water supply. Like the first-class coach the cars have blinds at the windows but they are made entirely of oak instead of having poplar slats as in the first class coach. The floor is without covering but has slats in the aisle between the seats and on the platform.

The interior finish of the dining car in the dining compartment, buffet room and inside vestibule is selected mahogany, handsomely figured and richly colored. The finish was given most careful treatment in every detail for the purpose of obtaining an exceedingly



STEAM CARS FOR ARGENTINA—Plan of Dining Car Which Seats 32 Passengers

beautiful effect from the natural features of the wood. The interior finish of the kitchen is also mahogany but much less elaborate than that of the dining room. The general plan of the car is shown in an accompanying engraving. The kitchen is at one end with everything necessary for preparing and storing the food; refrigerator, ice chests, sinks, range, coal boxes, wardrobes for attendants, warming closet for



STEAM CARS FOR ARGENTINA—The Kitchen is 12 ft. 4 in. Long—Its Convenient Arrangement is Shown in the Plan on the Opposite Page

dishes, shelves and drawers for kitchen utensils and racks for crockery. The pantry adjoining the kitchen has cupboards, shelving and racks for china and other ware, sink, ice boxes and serving table. Facing the dining room is the sideboard and drawers for silver. On each side are fruit and linen lockers. The dining room has eight tables for four persons each, making the dining capacity thirty-two. Between the dining room and the end of the car is a room with ice boxes for the storage of wines and liquors and a locker for the storage of soiled

linen. There are alcoves at each end of the dining room for flowers and ferns and an unusual feature is hooks in the ceiling from which hanging baskets of ferns can be suspended in the center of the car.

The baggage and mail car has pine interior finish and a pine partition between the two compartments. A small room in the baggage compartment, against the compartment bulkhead, has a folding desk,



STEAM CARS FOR ARGENTINA—The Most Effective Decoration of the Dining Car is the Carefully Selected Mahogany Used in the Finish—The Grain and Color Can Not be Shown in an Engraving

case for documents and a seat. There is also a small safe. The mail compartment is equipped with letter cases and boxes, folding pouch rack and distributing table and drawers for special material. There is also a saloon with washstand and dry hopper.

All of the cars were assembled, mounted on trucks and photographed before being dismounted for shipment to Argentina. Only the flooring and canvas roof covering were not included in the complete assembly of parts and equipment. After being dismounted the

various portions of the cars were boxed for ocean shipment, a branch of the business in which Wason Manufacturing Company by experience extending over many years has reduced to a system which insures the receipt of the cars at destination in perfect condition and which enables the cars to be assembled with orderly method.

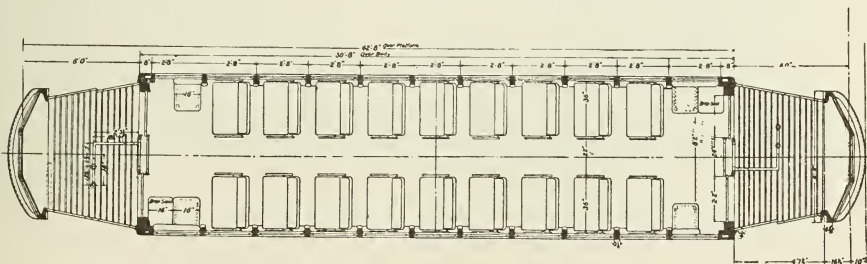
The cars are mounted on Brill No. 27-E2 trucks with an 8-ft. wheel base.



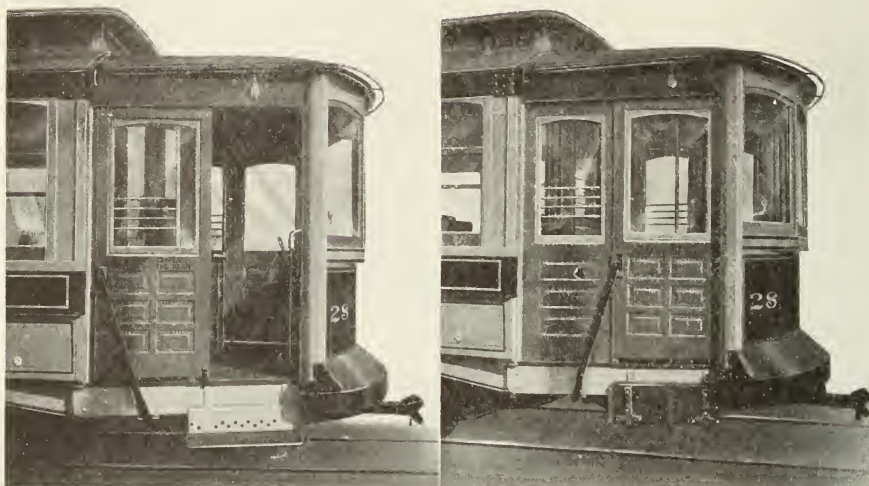
PAY-AS-YOU-ENTER TYPE CARS FOR ROANOKE AND LYNCHBURG

THOROUGHLY MODERN EQUIPMENT

EIGHT Pay-As-You-Enter cars, which have been delivered by The J. G. Brill Company during the past month for service in Roanoke and Lynchburg, Va., are in many respects the most modern cars of the type which have been built, combining as they do the better features from a number of earlier orders for other roads and being perfected in dimensions and minor details as a result of a study of other Pay-As-You-Enter cars in service. Four of the cars are for the Roanoke Railway & Electric Company and are to be used exclusively in interurban service. For that reason they have a four-motor equipment. The remaining



PAY-AS-YOU-ENTER CARS FOR ROANOKE AND LYNCHBURG—By the Use of Folding Seats at the Ends a Seating Capacity of 42 is Secured and there is Practically No Reduction in Seating Capacity Because of the Pay-As-You-Enter Feature



PAY-AS-YOU-ENTER CARS FOR ROANOKE AND LYNCHBURG—The Front Exit Has a Thoroughly Practical Mutually Operating Folding Step and Sliding Door—The Motorman's Lever for Operating the Door and Step is Shown Near the Brake Staff in the Left Hand View

cars for the Lynchburg Traction & Light Company conform to the standard. In addition to the Pay-As-You-Enter features, the cars embody the Brill patented semi-convertible window arrangement. Their dimensions are as follows:

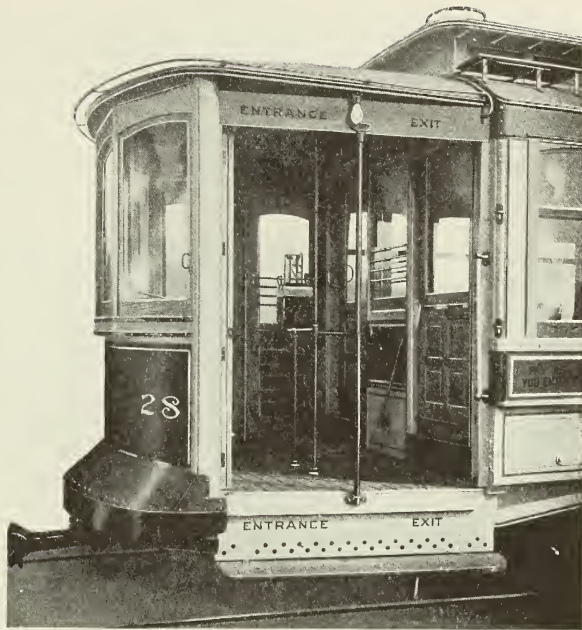
Length of carbody over end panels	30 ft. 8 in.
Length over platform crownpieces	42 ft. 8 in.
Width of car at sill	8 ft. 1½ in.
Width over posts above belt rail	8 ft. 4 in.
Height from rail over trolley board	11 ft. 8 in.
Weight	
Car body and air brakes	21,505 lb.
Motors and electrical equipment	12,858 lb.
Trucks	11,632 lb.
Total	44,995 lb.
Trucks	Brill No. 27-GE 1
Motors	4 G. E. 40 h. p.

The cars are the double-end type with platforms which it should be noted are only 6 ft. long, a careful study of the requirements in this connection under a variety of conditions clearly indicating that 6 ft. provides ample room for expeditious handling of passengers even

under such exceptional conditions as those to be found on the Third Avenue Railroad, New York City. The moderate length also eliminates the objections from a structural standpoint, which have been made to the extreme platform overhang of Pay-As-You-Enter cars. The moderate length in addition removes much of the danger of accidents to vehicles and pedestrians when the cars are rounding curves.

The platforms are full vestibuled. On the controller side of

the car at both ends are double folding doors which are arranged to fold up against the controller. At the center of the platform opening is a



PAY-AS-YOU-ENTER CARS FOR ROANOKE AND LYNCHBURG—The Exit Door in the Rear Bulkhead is Controlled by the Conductor With the Lever Between the Bulkheads—Step Lights are Used at Front and Rear



PAY-AS-YOU-ENTER CARS FOR ROANOKE AND LYNCHBURG—The Cars Have All the Modern Improvements of the Pay-As-You-Enter Arrangement With the Brill Patented Semi Convertible Window Feature—Note the Reasonable Length of the Platforms

vertical pipe stanchion and a drop bar. When closed, the doors are held securely against the pipe stanchion by the bar which also serves to operate the folding step. The brake staff or exit door side of the platform has a sliding door. Both the door and the panel against which it slides have removable sash and screens for summer use. The sliding door and a mutually operating folding step can be manipulated

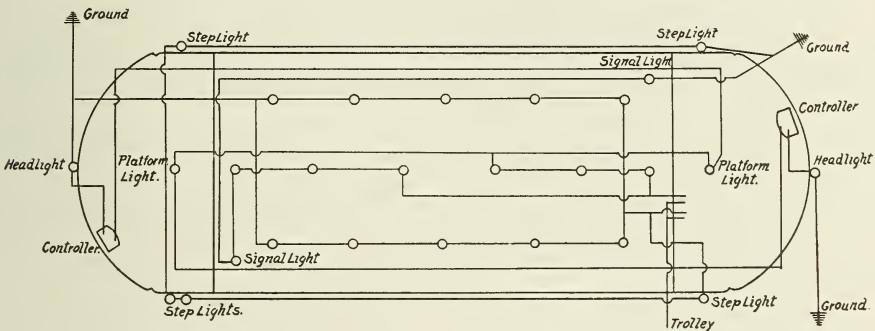


PAY-AS YOU-ENTER CARS FOR ROANOKE AND LYNCHBURG—The Interior Finish is Ash—Brill Winner
Seats 36 in. Long Are Used But a 24 in. Aisle is Secured by the Use of the Brill Semi-Convertible Window Arrangement Which Saves Space Below the Belt

by the motorman by a lever. This feature has been carefully worked out to insure the perfect operation of door and step in conjunction. The exit and entrance doors in the bulkheads are both the sliding type which it is believed has a number of advantages over an arrangement with one or both swinging doors. The exit door is fitted with a lever by which the door can be opened or closed from the platform.

The interior finish of the cars is ash with 3-ply birch veneer headlining. The seats are Brill Winner 36-in. long and in connection with

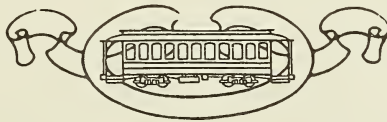
the Brill semi-convertible window arrangement give an aisle 24-in. wide. In addition to the nine transverse Winner seats on each side of the car, there are longitudinal seats occupying the space of one window at both sides of the car and at both ends, and at the diagonally opposite corners at which the exit doors are located are drop seats, thus making the total seating capacity of the cars 42 passengers. Two modern features are the push button signals on each post and the lights



PAY-AS-YOU-ENTER-CARS FOR ROANOKE AND LYNCHBURG—Wiring Diagram Showing the Provision for the Step Lights

above each step. The arrangement of the lights is shown in the accompanying wiring diagram. No hand strap poles are used, but hand straps supported on individual castings are provided at both ends of each car. The omission of rods has been for the purpose of doing away with all parts that might collect dust. In other ways an effort has been made to eliminate parts or places which might collect dust.

The cars are mounted on Brill No. 27-GE1 trucks which have a 4-ft. 6-in. wheel base and 33-in. cast iron wheels. These trucks are equipped with Brill Half-Ball brake hangers and A. S. I. R. A. standard brake shoes and brake shoe heads.



CARS FOR THE AKRON LINES OF THE NORTHERN OHIO TRACTION & LIGHT COMPANY

FULL CONVERTIBLE ON ONE SIDE

ON another page of this issue editorial comment is made that the so-called most modern type of car with features to meet metropolitan conditions may not be adapted to the conditions of some other city. As an instance of this circumstance, the Akron lines of the Northern Ohio Traction & Light Company have for some time past been using equipment embodying the Brill patented full-convertible feature on one side and a recent order for six more cars of the same type, which have been built and delivered by the G. C. Kuhlman Car Company, confirms the opinion of the management of the road that conditions in Akron are best met by that type of equipment. In summer, cars of the type appeal to the public in the same way as an open car and have greater seating capacity than any other type of car.

The windows as well as the lower panels on the outside of the car are fitted with the Brill patented convertible car mechanism so arranged that they will raise into the roof. On the other, or devil strip side of the car, ordinary drop sash are used and the car has fixed panels to the height of the window rail. To obtain maximum seating capacity in summer the seats are built in two sections, one section being 36 in. long and the other the length of the remaining interior transverse measurement between posts. The seats are placed transversely and are 13 in number and for summer service the shorter section is placed so as to form with the longer section a transverse seat the entire wide of the car, the panels and windows on the outside of the car are raised into the roof and the running board is employed in the same manner as with an ordinary open car. In winter the short sections of seats can be arranged longitudinally to form a seat along the side of the car. Conforming with this arrangement for winter service there are single



CARS FOR AKRON, OHIO—The Cars Are the Single-End Type and Have the Devil Strip Side Panelled and Arranged for Drop Window Sash

sliding doors in the bulkheads near the corner posts on the step side of the car. Each car shows the following principal dimensions:

Length of car body over end panels	35 ft. 6 in.
Length over vestibule sheathing	44 ft. 2½ in.
Width of car at drip rail (extreme)	8 ft. 6 in.
Height from top of rail to top of trolley board	12 ft. 1½ in.

The cars are mounted on Brill No. 27-F1 trucks with 4-ft. wheel base and 33-in. wheels. The trucks are spaced 23 ft. 6 in. between centers.

A feature of the Brill convertible system is the step heights which it obtains by employing a Z-bar side sill. By this arrangement the height from top of rail to top of trolley board is divided into three steps corresponding to the steps from the ground to the car floor by way of



CARS FOR AKRON, OHIO—On the Outside of the Cars the Panels and Window Sash Slide Into the Roof—The Arrangement is Covered by Brill Patents

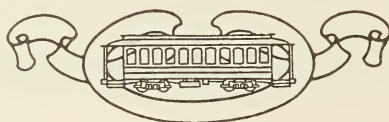


CARS FOR AKRON, OHIO—In Winter Service the Short Seat Section is Placed Longitudinally Against the Side of the Car in Order to Provide An Aisle

the platforms when drop platforms are used, as they are in these cars. Thus in this case the step heights formed by the running board and the Z-bar sill are as follows:

Top of rail to running board	17 in.
Top of running board to sill step	$13\frac{1}{8}$ in.
Top of sill step to floor level	$10\frac{5}{8}$ in.

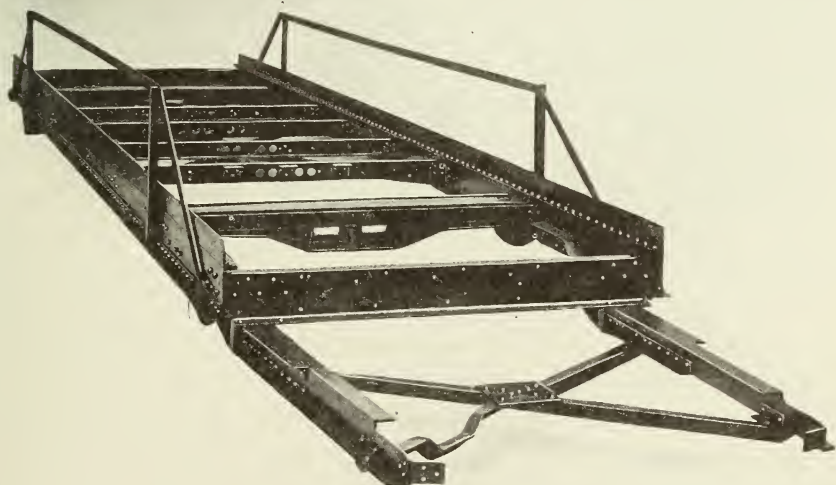
The interior finish of the cars is cherry and 3-ply poplar veneer ceilings are employed. Push buttons are placed on each seat post and the seats are upholstered with rattan.



MORE PAY-AS-YOU-ENTER CARS FOR CHICAGO

STEEL UNDERFRAME EQUIPMENT

THUS far the majority of cars built for city electric railway service have had either wood or composite steel and wood underframe. A lot of fifty Pay-As-You-Enter cars for the Chicago City Railway, however, which have just been completed by The J. G. Brill Company, have the underframes built entirely of steel and they are accordingly of special interest. The principal members of the underframe are the side sills, which are built up from 10-in. (15 lb. per ft.) channels $2\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{5}{16}$ -in. and 3 by $\frac{5}{16}$ -in. angles. The channel flanges are turned towards the longitudinal center line of the car and the channel reinforced at the bottom on the outside by the smaller angle and on the top at the inside by the larger angle. The 5-in. leg of the top angle has its back set flush with



MORE PAY-AS-YOU-ENTER CARS FOR CHICAGO—The Cars are 32 ft. Long Over Sills and 46 ft. Over Bumpers. Yet the Underframe Which, Aside from the Cast Bolsters is Built From Structural Material, Weighs Only 3790 lbs.

the back of the channel. The side sills are further reinforced by an upper truss of $2\frac{1}{2}$ by $\frac{7}{16}$ -in. bar steel having 2 by 2 by $\frac{7}{16}$ -in. steel angle struts at each bolster.



MORE PAY-AS-YOU-ENTER-CARS FOR CHICAGO—Railing Arrangement for Motorman's Platform—The Doors Are Folded Back In Order to Take the Photograph

The end sills are 10-in. (15 lb. per ft.) standard channels with the flanges faced towards the ends of the car and securely connected with the side sill channel by cast steel angles which have a horizontal rib to carry the strap which supports the platform knee. The channel end sills are faced with fir and finished with No. 16 gauge steel. There are four crossings between bolsters, each of which are 5-in. ($6\frac{1}{2}$ lb. per ft.) channels which are attached to the side sill channels by angles. Each crossing is provided with

a suitable fir nailing strip for the floor. Between the four crossings and on each side of the center line of the car fir floor joists are provided as a support under the seats and to stiffen the flooring. Additional stiffening is provided by fir joists parallel to the steel crossings and extending between the fir joists first referred to.

On each side of the body bolster is a $3\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{3}{8}$ -in. angle with its $2\frac{1}{2}$ -in. flange faced towards the bolster. Each angle iron

bolster crossing is provided with a fir filler. In addition to these and the other parts of the steel underframe which are referred to above and which are shown in an accompanying illustration, there are three longitudinal tees extending from the bolster crossings to the end sills. There are also diagonal braces made from $2\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{3}{8}$ -in. angles



MORE PAY-AS-YOU-ENTER CARS FOR CHICAGO—The Window Screens Which Are Used in Summer Are Replaced in Winter By Storm Sash

which pass between and under the 5-in. crossing channels nearest to the bolsters. The body bolsters are cast steel with their ends gibbed under the side sills and designed to carry safely a load of 10,500 lb. at each end when supported at the center.

The platforms are held in position by two main platform knees each of $3\frac{1}{2}$ by 6 by $\frac{3}{8}$ -in. Z-bars with the top flange facing toward the longitudinal center line of the car. The Z-bar knees are reinforced at the end sills by $2\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{3}{8}$ -in. angles. They also have fir filler pieces on the outside. Oak crownpieces and fir intermediate platform knees are provided. The bumpers are 7-in. (9.75 lb. per ft.) channels which are fastened to the ends of Z-bar platform knees by angles.

The platforms are diagonally braced by $2\frac{1}{2}$ by 2 by $\frac{3}{8}$ -in. angles with flanges turned down. The main Z-bar platform knees are attached to the steel end sill channel by a $2\frac{1}{2}$ by $\frac{5}{8}$ -in. steel U-strap which is hung from the outside face of the end sill channel by means of the special cast steel connecting angle which ties the side and end sills together.

The fifty cars which have just been delivered are the first built for the Chicago City Railway with steel underframes. In general appear-



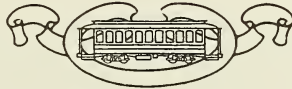
MORE PAY-AS-YOU-ENTER CARS FOR CHICAGO—The Cars Have A Special Ventilation System—Part of the Equipment is Shown On the Front and at the Sides of the Monitor Roof—
The Trucks Are Brill No. 27-FE2

ance and features, however, they are very similar to 500 cars built by the various Brill companies for the railway during the past two or three years. The following is a statement of the principal dimensions of the new cars:

Length over corner posts	32 ft.
Length over bumpers	46 ft.
Width over all	8 ft. 6 in.
Height top of rail to top of trolley board	11 ft. 9 in.
Truck centers	20 ft. 5 in.

The cars are of the double end Pay-As-You-Enter type and are mounted on Brill No. 27-FE2 trucks which carry 2 G. E. 40 h. p. motors per truck. The interior of the car is finished in cherry and cane upholstered. Reversible seats are used except at the ends, where there are longitudinal seats. A general description of the cars can be found in Brill Magazine for March, 1908. With exception of the addition of the steel underframe and some slight changes in the

dimensions the cars are the same. One of the new cars weighed complete with all equipment 51,850 lb. which is divided as follows: Car body 21,310 lb.; trucks 16,100 lb.; motors, electrical equipment and air brakes 14,440 lb. The steel underframe weighs 3,790 lb.



CARS FOR THE TOLEDO RAILWAYS & LIGHT COMPANY

PAY-AS-YOU-ENTER TYPE

THE Pay-As-You-Enter cars recently delivered by the G. C. Kuhlman Car Company for service in Toledo are twenty in number and the single-end type. The cars are vestibuled at the front and are mounted on Brill No. 27-F1 trucks. Their principal dimensions are as follows:

Length of car body at end sills	30 ft. 8 in.
Length over vestibule sheathing	41 ft. 6 in.
Length of front platform	4 ft. 4 in.
Length of rear platform	6 ft. 6 in.
Width of car body at sill	7 ft. 11½ in.
Width over drip rail (extreme)	8 ft. 8 in.



CARS FOR THE TOLEDO RAILWAYS AND LIGHT COMPANY—As the Cars Are the Single-End Type, A Short Platform is Used At the Front—The Rear Platform is Supported on Channel Truss Knees

Following the practice of most single-end Pay-As-You-Enter cars which have been built there is a single sliding door placed at the right hand side in the front bulkhead, the rear bulkhead having the standard two door Pay-As-You-Enter arrangement. The step opening of the front platform is enclosed by a folding door which is operated mechan-

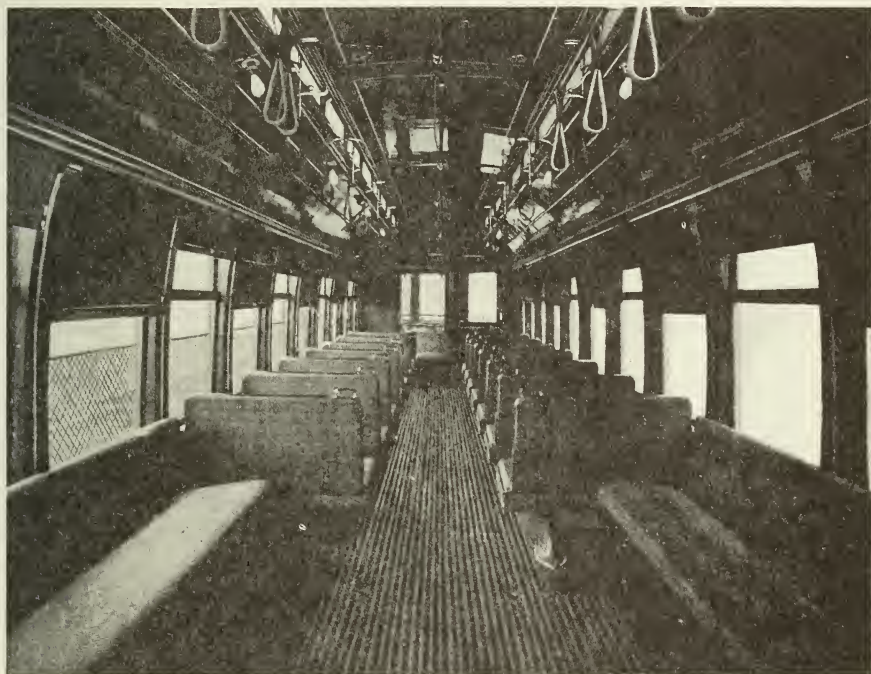


CARS FOR THE TOLEDO RAILWAYS AND LIGHT COMPANY—Interior View Looking Towards the Back Platform—The Cars Have the Brill Patented Semi-Convertible Window Arrangement and Are Finished in Cherry

ically by the motorman. The door mechanism is so arranged that the folding door and folding step are operated in unison. Both front and rear vestibules are panelled on the devil strip side. The posts on the rear platform are grooved for vestibule sash and the platform sheathing is double so that the rear platform could be vestibuled if it were considered advisable at some later date.

The seating arrangement provides 14 transverse seats upholstered in rattan, seven on each side of the car, two longitudinal seats at the rear taking the space of two and one-half windows each, a longitudinal

seat on the devil strip side at the front for two passengers, one on the opposite side for one passenger and a seat against the front bulkhead at the end of the aisle for one passenger. This arrangement secures the maximum seating capacity without conflicting with the arrangement of doors and the operation of the Pay-As-You-Enter systems.



CARS FOR THE TOLEDO RAILWAYS AND LIGHT COMPANY—Interior View Looking Towards the Front and Showing the Seat Against the Front Bulkhead and the Long Longitudinal Seats At the Rear

The interior finish of the cars is cherry and the ceiling is $\frac{1}{4}$ -inch composition board.

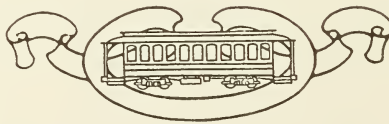
The bottom framing of the cars comprises 4 by $7\frac{3}{4}$ -in. yellow pine side sills plated with 15 by $\frac{3}{8}$ -in. steel plate which is reinforced at the bottom by a 6 by $3\frac{1}{2}$ -in. angle. The end sills and center crossings are white oak. The platforms are supported on channel iron knees. The steps have malleable iron hangers with oak treads and a back fender or riser closing the step opening so as to prevent accidents by the passengers feet slipping through. The step treads are covered with metallic safety tread.

The roof is built on lines of the monitor deck with a steam coach hood over the front vestibule and has 11 ventilator sashes on each side, every other sash being fitted with a ventilator controller. The special equipment of the cars include Brill angle iron buffers, Brill ratchet



CARS FOR THE TOLEDO RAILWAYS AND LIGHT COMPANY—The Rear Platform is Not Vestibuled But is Built for the Installation of Vestibule Sash at a Later Date if Found Desirable

brake handles, Brill seats, Dedenda gongs and Retriever signal bells. The outside fittings are all bronze. The sashes are fitted with metal stiles and curtains are provided for all side windows and for the large window in the front bulkhead. Push buttons are located on each side post and placed about 52 in. above the floor.



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of each month by the

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In the interests of The J. G. Brill Company, American Car Company, John Stephenson Company, G. C. Kuhlman Car Company, Wason Manufacturing Company, Danville Car Company, Compagnie J. G. Brill.



EVEN the earliest type of car had certain advantages such as the low first cost of the equipment and its light weight, which are not inherent to the modern prepayment car. Similarly more modern cars have additional advantages not possessed by the most modern car, and it is owing only to the fact that the most modern car presents some advantageous features which because of changed conditions are in greater demand than the necessarily discarded features of the old type equipment, that a change is made which is looked upon as an advance. But conditions do not change everywhere in equal degree or with equal rapidity and hence it follows that the so-called most modern type of car may be an advance and really better suited to the conditions in one city than any other type of equipment and yet the adoption of that type in some other city might be a retrograde movement. That is the

reason that a universal and absolute standard type of equipment is and always will be an impossibility. To cite a concrete example, of all types of cars the open car has the greatest seating capacity for given length and width, it is probably more popular with the public than any other type and it is more quickly loaded and unloaded than any other car. All of those features are desired and much desired for every metropolitan city car, yet it is because the open car lacks some other features—or to state the converse, because other cars have additional features—which individually or collectively are considered more essential than all of the advantages of the open car, that the open car is not the “standard” metropolitan city car. For instance, there is practically no large city in which the open car can be used throughout the year and hence, in addition to the open car some other type of car is an absolute necessity. The question of first cost of equipment immediately arises and the open car is perhaps discarded solely because the gain which it would secure by carrying more seated passengers at less cost per passenger and by obtaining passengers who would not otherwise ride, would not pay dividends on the necessary investment in two types of equipment. Similarly, the extra fares secured from an open car because of its popularity or the number of passengers it will carry might not

pay the losses due to accidents to which the car is peculiarly liable in city use. Or the increased fares secured from a prepayment car, by reason of securing a fare from every passenger, where there is a great density of traffic might be greater than the fares actually secured from a larger number of passengers in open cars, some of whom would not ride in the closed cars. In the same way the argument could be continued to cover other points with permutations and combinations almost *ad finitum*. For that reason the average purchaser of rolling stock, instead of attempting to weigh one feature of advantage against another, buys a particular type of rolling stock because several features of that type have impressed him as being of greatest advantage to him, or because he blindly follows the successful practice on some other road which may be the result of chance or the result of a careful study of conditions which are entirely different from those on the other road. And when you consider the difficulty of obtaining accurate data on which to base conclusions, these circumstances are not surprising. There are, however, many indications that every feature of rolling stock is more carefully considered to-day than at any time in the past and that there is an increasing number of officials who base the selection of their cars on a systematic study and comparison of different types. In this connection, we recall,

with pleasure the discussion in the technical press a year or so ago between Mr. Lee H. Parker, of the Stone & Webster Engineering Corporation, and Mr. W. H. Heulings, Jr., of The J. G. Brill Company, relative to the merits and earning capacity of a mixed equipment of open cars and closed box cars as compared with an equipment of semi-convertible cars. The present discussion of weight with detailed statements of the weights of all parts entering into the construction of a car and the careful calculation of the actual current consumption and its cost, is an evidence of the forward movement. In connection with the movement towards light weight equipment, we do not think that it is too early to enter a word of warning. There is too much of an eager pursuit of a decrease in weight and too much of a study of how and where it can be obtained with too little study of the effect the decrease is to have on the strength and life of the equipment. The two should go hand in hand. We are decidedly in favor of light equipment, have always favored it, and are making efforts to secure a reduction in the weight of equipment. But we think that if the movement for light weight equipment continues on the present basis, the movement will go too far, just as it did when the fetich was, large, substantial cars. The American Street & Interurban Railway Association might well secure the co-operation

of the University of Illinois or Worcester Polytechnic Institute for a systematic study of the question of weight of equipment in connection with the strength of materials. However, these latter remarks are not strictly germane to the point which we wish to make—that the type of car used by the large city line may not be adapted to your needs, nor is it certain that the car used in a city of the same size as yours is even in general type adapted to your requirements. It will pay you to study most carefully the conditions you have to meet, get expert advice if you can afford it and don't forget that the car and truck builder knows more about some phases of the subject than anyone else. If he didn't he wouldn't be building cars and trucks.



ON December 31, 1908, the length of the steam railroads of the United States was 232,045.9 miles. Accurate figures for electric railroads are not available, but on approximately the same data the length of the street and interurban railroads was in round figures, 35,000 miles. On a mileage basis the electric railroads shrink into insignificance and a comparison of gross earnings gives them a not much better showing. The gross receipts of the steam railroads in 1908 amounted to \$2,590,400,124. The gross receipts of the electric railroads are less

than one-sixth of that amount, being \$440,000,000 annually. Practically all of that amount is passenger earnings which compares with passenger earnings of the steam railroads amounting to \$575,246,516. On that basis the electric railroads make a more favorable showing and taking into consideration that the number of passengers carried by the steam railways was during 1908 not more than 900,000,000 or to be exact 868,961,474, the electric railroads are in a class by themselves with about 10,000,000,000 passengers carried per annum. Those who are doubtful of the future of electric railways or their relative progress should recall also that the first steam railway in the United States was the Baltimore & Ohio on which construction was started in 1828 and which was opened to service in 1853. The first operating electric railway in this country was an experimental line at the laboratory of Thomas Edison at Menlo Park which was built in 1880. The first regular electric railway in the United States was one operated on Hampden Road, Baltimore, in 1886. With less than a third of the opportunity of the steam railroads in point of time and with scarcely an eighth of the track mileage, the electric railways already carry more passengers annually than the steam railroads. With gross receipts amounting to less than one-sixth of those of the steam roads and with only an eighth of the mileage of the steam railroads, the electric railroads are

only in their infancy. Fifty years hence when the oldest of them is as old as the Baltimore & Ohio Railroad is to-day, what will their status be?



THIS issue of Brill Magazine makes its appearance during the convention of the Master Car Builders' Association and the American Railway Master Mechanics' Association at Atlantic City and will be circulated among the members of those associations in attendance at the conventions. For that reason the current number of Brill Magazine bears slightly more than its usual proportion of matter of probable interest to steam railway officials. This in spite of the fact that the interests of steam and electric railways are continually growing closer and that accordingly officials of one branch of the service can at all times find in the work of the other branch helpful hints and suggestions. To a large extent the Master Car Builders' and Master Mechanics' associations have been the inspiration of the American Street and Interurban Railway Engineering Association, and a study of their work discloses a similarity between the questions which aroused lengthy discussion in those bodies and the topics which are of particular interest at the present time to the associations allied with the

American Street and Interurban Railway Association. For the most part the electric railway associations have very wisely followed the precedents set by the steam railway mechanical and other associations, though there has been some inclination to consider electric railway conditions by themselves without reference to steam railway practice. Yet the more one considers the practice of the steam railways in any particular in which it corresponds to electric railway work, the more directly one is led to the conclusion that steam railway practice is, all things considered, wise and that steam railway precedents are for the most part good. You may review the discussion which took place at the conventions of the Master Car Builders' Association in previous years, for instance in connection with wheel standardization, and you will be surprised at the similarity of that discussion to the discussion on the same subject in the Engineering Association meetings. Almost any other parallel subject discloses the same similarity. While emphasizing the value to the American Street and Interurban Railway Association of the precedents set by the Master Car Builders', Master Mechanics' and other steam railway associations, the efforts of the electric railway associations to solve their own problems are none the less commendable.

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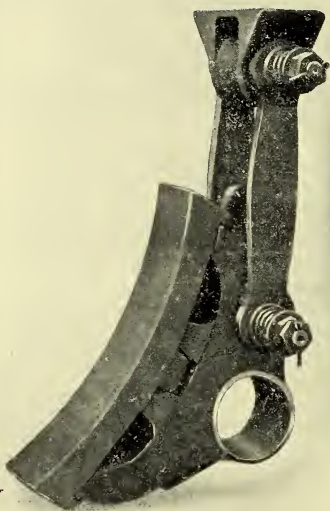
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HALF-BALL BRAKE HANGER WITH M. C. B. BRAKE HEAD

In steam railway freight or passenger service the Brill Half-Ball Hanger will show the same superiority over the ordinary link and pin and other type brake hangers that it has evidenced on electric railways. The hanger forgings with half ball ends receive the wear and the strain. The bolt is never in shear because it serves solely as a compression member for the spring which holds the hanger forgings in their hemispherical malleable sockets. Simple, durable, self-adjustable.

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BRILL MAGAZINE



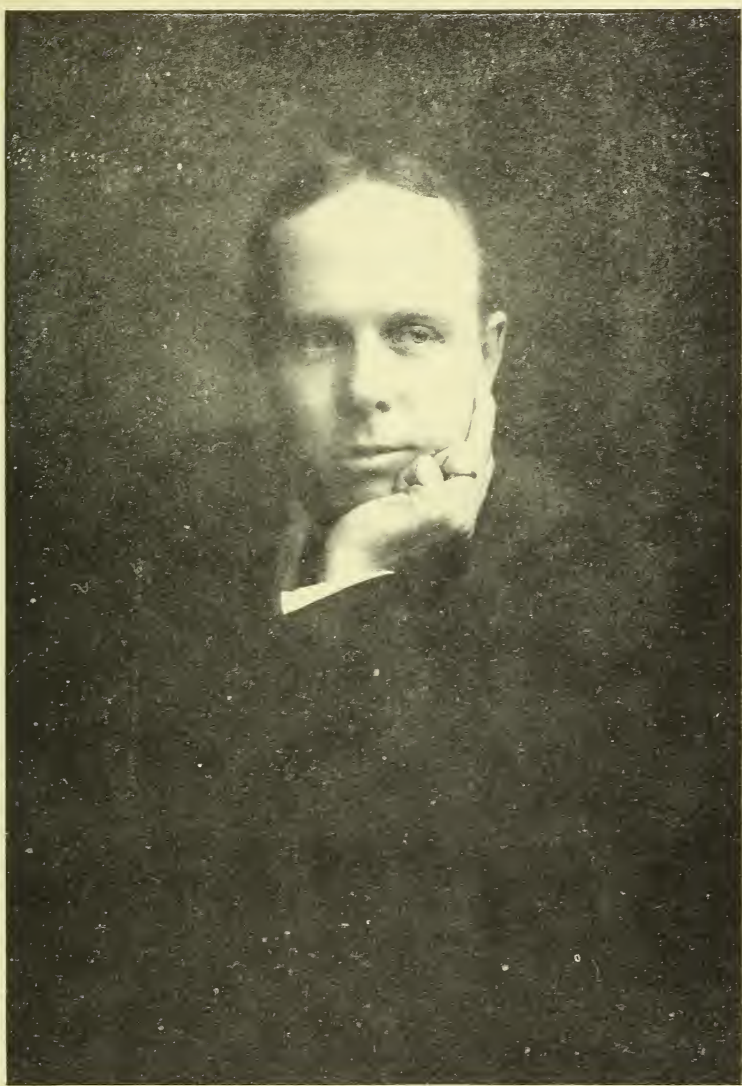
The Ginza
Tokyo, Japan



BRILL FARE BOX No. 3

If you are under the impression that you are getting the best returns from your prepayment cars by the use of a fare register and old methods write us for the names of some of your electric railway friends who are using Brill Fare Boxes. Ask them what they found out after the boxes were installed. How much the receipts increased over prepayment collection with fare registers only; how hard the men tried to rob the boxes when they found they couldn't rob the company in any other way and how well they succeeded. A catalogue describing the Fare Box shown above and others is yours for the asking.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



M. H. Stanley

BRILL MAGAZINE

Vol. IV

JULY, 1910

No. 7

ALBERT H. STANLEY

[WITH PORTRAIT INSERT]

ALBERT H. STANLEY, general manager of the Underground Electric Railways Company of London, England, and managing director of the London United Tramways Company, though born in England about 37 years ago, entered street railway service in the United States. He began his career as office boy for the Detroit City Railway in the horse car days, afterward serving for the same company and its successors as time-keeper, bookkeeper, traffic superintendent, division superintendent, assistant general superintendent and finally as general superintendent. During his service in Detroit the length of lines increased from 43 miles to 550 miles. In October, 1903, Mr. Stanley accepted the position of assistant general manager of the street railway department of the Public Service Corporation of New Jersey and in February of the following year became general manager of that department. In January, 1907, Mr. Stanley assumed the duties of general manager of the corporation, resigning three months later to accept the general managership of the Underground Electric Railways Company, of London, England, a company of which he is now a director. The railways under his management include the Metropolitan District, Baker Street & Waterloo, Great Northern, Piccadilly & Brompton and Charing Cross, Euston and Hampstead. As managing director of the London United Tramways, Ltd. Mr. Stanley is responsible for some 102 miles of route with equipment of 340 double truck motor cars.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

TOKYO, JAPAN*

IN 1903 three electric railway companies were established in the city of Tokyo for passenger traffic and all the old horse tramways were electrified. The roads of these three companies were united under one management in September, 1906 and the Tokyo Tetsudo K. K. or Tokyo Tramway Company was organized with a

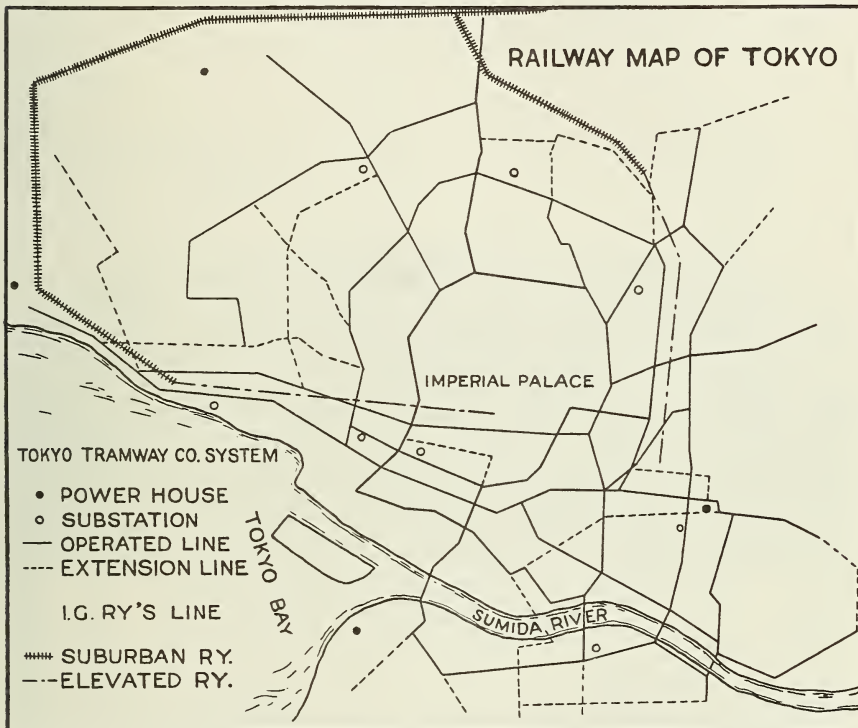


CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Standard Single Truck Car of Tokyo, Japan, the Product of Japanese Builders—Mounted on Brill No. 21-E Truck

capital of \$30,000,000. It is a joint stock corporation operating under a perpetual franchise from the city and managed by a board of directors consisting of the president, eight directors and three auditors who are chosen by the stockholders. The number of employees is about 7,000.

* This is the nineteenth in a series of articles, each of which discusses the tramway system of some important city of the world with particular reference to the type of car which is used.

As shown in the accompanying map the city of Tokyo covers about 30 square miles with a population of over 2,000,000. The total length on a single track basis of the electric railway system operated at present is about 110 miles with proposed extensions of about 80 miles which are to be completed within one or two years. In addition there



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Transportation System of Tokyo Includes 110 Miles of Tramway and the Elevated Lines of the Imperial Government Railways

are the lines of the Imperial Government Railways operated on elevated track in the city.

The gauge of the track is 4 ft. 6 in. which was chosen as standard over 30 years ago when the horse tramways were established and at the time of the electrification of the lines, the same track was used without any modification. The rails, however, are being continually replaced with heavier ones and at present 95-lb. grooved girder steel rails are in place on all the important lines.

The number of the cars for passenger traffic in 1909 was 1061 divided in size and type as shown in the following table:

Length of car	Width of car	Seating capacity	Number of cars	Type
25 ft.	7 ft.	40	439	Single-truck
26 ft.	7 ft.	40	292	Single-truck
27 ft.	7 ft.	40	210	Single-truck
36 ft.	7 ft.	66	120	Double-truck



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Standard Double Truck Combination First and Second Class Car of Which 120 Are Now In Use—Mounted on Brill No. 22-E Trucks

The following table showing the average daily operations for a six months period of 1909 will indicate closely the extent of business of the company:

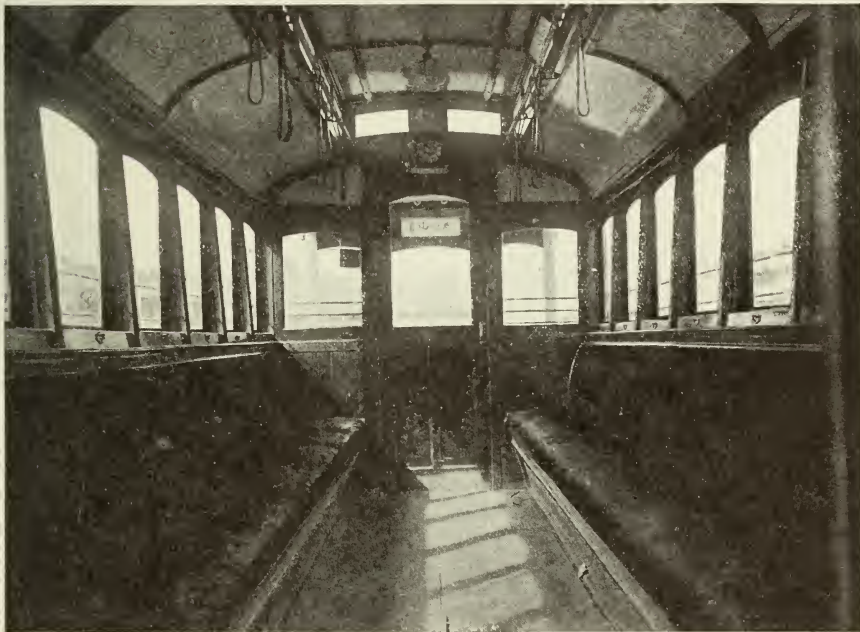
Month	Average number of cars running per day	Average car miles per day	Average number of passengers carried	Average passenger income per day
June	745	80,429	457,771	\$7,888.50
July	750	79,410	480,415	8,226.10
Aug.	730	77,049	437,237	7,421.00
Sept.	740	78,037	469,404	8,062.45
Oct.	772	81,200	493,761	8,632.70
Nov.	790	81,049	504,677	8,630.15
Dec.	754	79,524	473,822	8,142.70

The fare, including a transfer charge of 1 sen or one-half cent from any point to any other point, is 5 sen or 2½ cents for a single fare and

9 sen or $4\frac{1}{2}$ cents for a return ticket after seven o'clock in the morning. Before 7 a. m. the fares are 3 sen ($1\frac{1}{2}$ cents) and 5 sen ($2\frac{1}{2}$ cents) respectively.

All the passenger cars are closed and have longitudinal seats. They are the product of Japanese car builders, but the trucks were manufactured by The J. G. Brill Company and two other truck makers. At present the two following types of cars may be considered to be the standard:

	Type Single truck	Type Double truck
Length over end panels	20 ft. 0 in.	28 ft. 0 in.
Length over platform	27 ft. 0 in.	36 ft. 0 in.
Width over sills	6 ft. 0 in.	6 ft. 2 $\frac{1}{2}$ in.
Seating capacity	40 persons	66 persons
Width over posts above belt rail	7 ft. 0 in.	7 ft. 0 in.
Type of truck	Brill No. 21-E	Brill No. 22-E
Wheel base	6 ft. 0 in.	4 ft. 0 in.
Motors	Two 25 h. p.	Two 35 h. p.
Weight of cars and all equipment	18,000 lb.	32,000 lb.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Interior of Single Truck Car for First Class Service—All the Cars Have Longitudinal Seats

The cars are operated under short headway at a schedule speed of eight miles per hour on all lines and during the rush hours in the morning and evening the cars are invariably crowded. At these times even the double-truck cars are not large enough to carry all of the

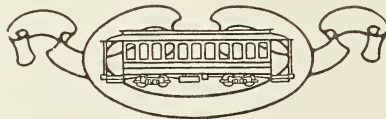


CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Steel Underframe Side Entrance Car for the Elevated Service of the Imperial Government Railways

passengers and as the use of trail cars is prohibited by the authorities, it is believed that larger cars will be demanded as an incident to the future extensions of the tramway system and for the comfort of passengers.

An interesting feature of the electrical equipment is the overhead trolley return, a single wire with ground return being prohibited by the municipal authorities.

We are indebted to Mr. I. Ito of Tokyo, Japan, for the facts embodied in the above article and the photographs from which the accompanying engravings were made.

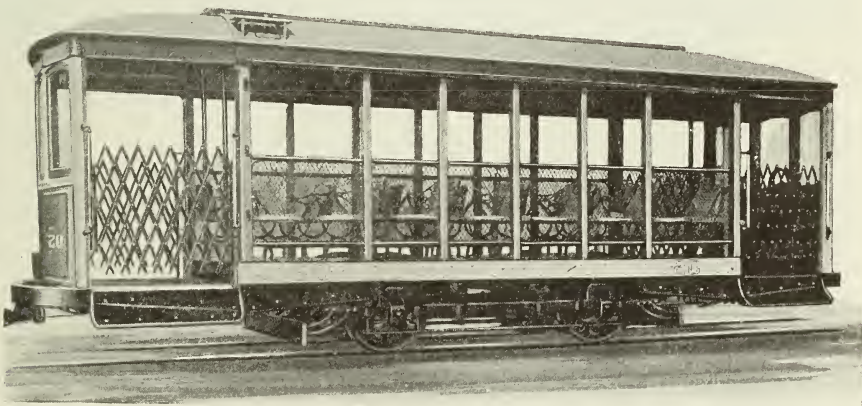


SINGLE-TRUCK OPEN CARS WITH PLAIN ARCH ROOFS

EQUIPMENT FOR CLARKSVILLE, TENNESSEE

CARS without monitor roofs it is claimed by many will be the next radical step in car design. Certain it is that the plain arch roof is looked upon with more favor at present than at any time recently and from a structural standpoint in weight, strength and cost the arch roof is undoubtedly superior to the monitor roof. The only arguments against it are the appearance and the difficulty of obtaining satisfactory ventilation. As far as open cars are concerned, however, the latter argument does not apply and it is believed that only familiarity creates the impression that a car with monitor roof is more attractive in appearance than one with an arch roof.

The cars for the Clarksville (Tenn.) Railway and Light Company, one of which is shown in an accompanying engraving, are assuredly not objectionable in appearance in spite of slight distortion due to the manner in which they were photographed. They are the single-truck type and have the following dimensions:



SINGLE TRUCK OPEN CARS WITH PLAIN ARCH ROOFS—The Cars for the Clarksville Railway and Light Company Are the Centre-Aisle Type and Seat 24 Passengers

Length over crown pieces	27 ft. 6 in.
Width over sills	8 ft. 6 in.
Length of each platform	5 ft. 0 in.

Aside from the use of the arch roof the cars are somewhat unusual in the omission of the running board and bulkheads. To prevent

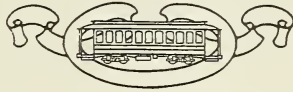


SINGLE TRUCK OPEN CARS WITH PLAIN ARCH ROOFS—There Are No Bulkheads but End Vestibules With Drop Sash Take Their Place—Duck Curtains Are Provided For the Sides of the Car

passengers getting off the car except at the platforms, a wire mesh screen extends from corner post to corner post. There are six reversible ash seats on each side of the center aisle, giving a seating capacity of 24. In place of the bulkheads at each end of the car, there are iron pipe stanchions from floor to roof and each platform end is provided with a stationary round front vestibule with drop sash. Brill folding gates are used at each step opening.

The bottom framing of the cars is standard with $3\frac{3}{4}$ by 7-in. yellow pine side sills plated with $\frac{5}{8}$ -in. steel plate 8-in. deep. The crossings and crown pieces are white oak. The corner and side posts, which are

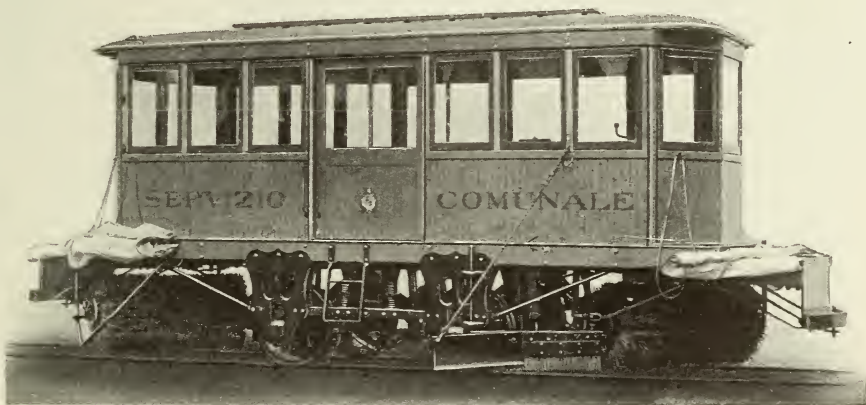
straight, are white ash, as is the interior finish of the vestibules. The ceilings are birds'-eye maple without decoration. Striped duck curtains are provided at the openings between posts.



SOME SUCCESSFUL RULES FOR SNOW FIGHTING

WHAT COMPRISES ADEQUATE EQUIPMENT

UNTIL weather forecasts can be made with accuracy farther in advance than at present the management of every northern electric railway must prepare snow fighting equipment in much the same manner that it buys insurance against fire. The snow fighting equipment must protect the whole system. It must insure against loss by the heaviest snow storm as well as the lightest. There is only one way to accomplish that result—have plenty of sweepers and plows and have them in condition just as you buy



SOME SUCCESSFUL RULES FOR SNOW FIGHTING—Brill Short Broom Snow Sweeper—An Efficient Snow Fighting Machine—In Use in Many Countries Throughout the World

insurance to cover the value of the property and do not allow the policies to lapse.

But even if it were possible to warn every road that now is the time to order new snow fighting equipment and to overhaul the plows and sweepers it has, there would still be some large system that would fail to do so and doubtless many small ones. It is as certain as winter that some large system will be tied up. It happened last year, it happened the year before and it will happen this year.



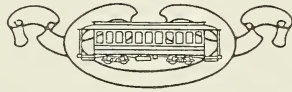
SOME SUCCESSFUL RULES FOR SNOW FIGHTING—Kuhlman Long Broom Sweeper With Some Special Features—Built for Use in Montreal

Last year we published the rules laid down by Mr. Duncan McDonald, manager of the Montreal Street Railway Company, by which it had year after year been able to handle an average snow fall of 120 inches without any stoppage of service on its lines. We repeat them because they are the best rules we have seen:

1. Have plenty of sweepers and plows.
2. Have them ready for immediate service.
3. Estimate liberally the possibilities of the storm.
4. Start your sweepers early in accordance with your estimate.
5. Keep them moving according to schedule until the storm is entirely over or until the service is found more than adequate for requirements.

Now the question is: What is plenty of sweepers and plows? For

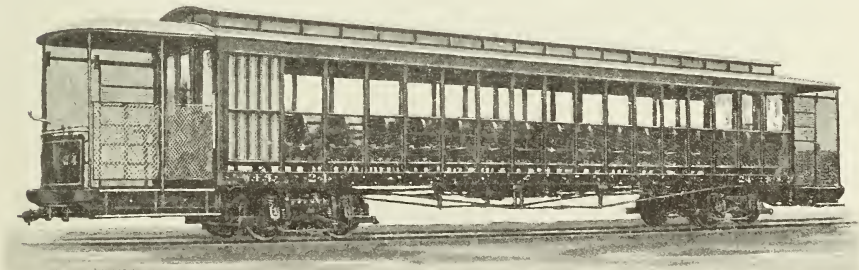
any State where there is an average snow fall there should be at least one sweeper or plow for every eight miles of track. The figure is based on statistics showing the actual number of sweepers and plows in service in New York state. Where there is a heavy snow fall during the winter or an occasional blizzard is almost an annual occurrence, a sweeper or plow to four miles of track has been shown to be a wise investment.



OPEN PAY-AS-YOU-ENTER TRAIL CARS

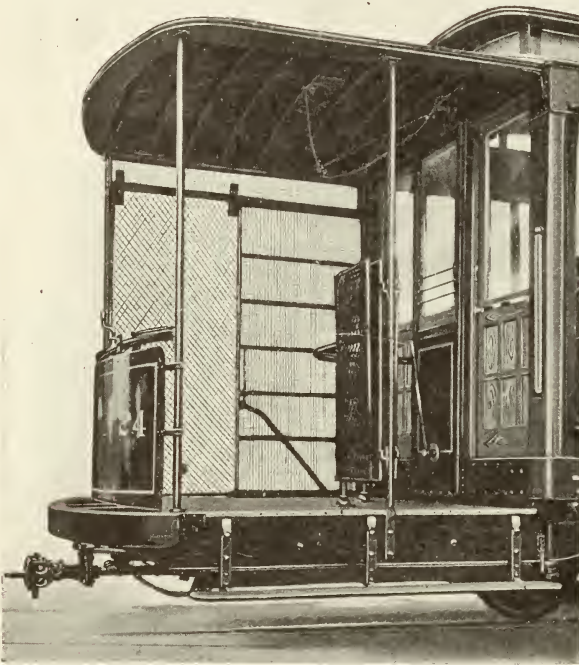
EQUIPMENT FOR WICHITA FALLS, TEXAS

FOUR open Pay-As-You-Enter cars recently built by the Danville Car Company and delivered to the Wichita Falls (Texas) Traction Company exhibit an entirely new adaption of the prepayment feature. The cars are unusually large, having a seating capacity of 64 and measuring 59 ft. 9 $\frac{3}{8}$ in. over crownpieces. They are the 16-bench center aisle open type with side screens. The platforms are each 7 ft. long and the cars are the double-end type. On the entrance side is a two-leaf swinging entrance gate and a single-leaf swinging exit gate, both of which are under con-



OPEN PAY-AS-YOU-ENTER TRAIL CARS—The Cars are Nearly 60 ft. Long and Seat 64 Passengers—They are Mounted on Brill No. 27-GE2 trucks

trol of the conductor. On the opposite side of each platform is a single sliding gate which is locked except when the platform is in use by the motorman. When operated as the front platform exit, the



OPEN PAY-AS-YOU ENTER TRAIL CARS—The Platforms Are Arranged for Double-End Operation and Have Folding Gates on the Entrance Side and a Sliding Gate on the Exit Side

sliding door is under control of the motorman and operates in unison with a folding step. The step on the entrance side of the platform is arranged to fold up and be held in place by a latch when not in service. At both ends of each car there is a bulkhead arranged with sliding entrance door controlled by the conductor with a lever and a sliding exit door.

The sides of the cars are protected by wire mesh screens and the platform gates both folding and sliding are made from wire mesh screen.

The screens between posts at the sides of the car extend from close to the floor to a point above the top of the seat backs, which are 18 inches high. The screens are surmounted by a pipe rail.

The interior finish of the cars is ash, including the Brill Winner seats which have ash slat seats and backs. The ceiling is birds' eye maple veneer. The curtains are striped duck mounted on spring rollers and extend all the way to the floor. The cars are equipped with a push button system and have the following special equipment:



OPEN PAY-AS-YOU-ENTER TRAIL CARS—The Wire Mesh Screen Used Between Posts is Capped by a Pipe Rail and Extends Nearly to the Floor

Brill ratchet brake handles of solid bronze metal, Brill angle iron bumpers, Brill drawbars, Dumpit sand boxes, Brill patented round corner seat end panels, Dedenda gongs and Retriever signal bells.

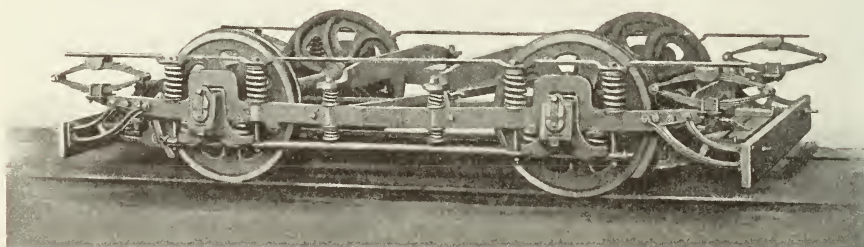
The cars though built for trail service are provided with trap doors to suit Westinghouse 101 B motors and the Brill No. 27-GE2 trucks on which the cars are mounted are arranged for motors. The trucks have a 4-ft. 6-in. wheel base and 33-in. cast chilled wheels.



A SHORT WHEEL BASE SINGLE TRUCK

BRILL TRUCK No. 21-C

IT has been quite conclusively shown that no single truck is satisfactory which relies solely on coil springs or elliptics and semi-elliptics for its spring action. The two types of springs must be used in combination to prevent the uniformity of action which results in galloping when the speed is increased. The coil springs act quickly, whereas elliptics and semi-elliptics yield more slowly, the two together giving steadiness and easy riding qualities. Another feature



A SHORT WHEEL BASE SINGLE TRUCK—Brill Truck No. 21-C—For a Very Short Car the Truck Secures the Best Relation Between Wheel Base and Spring Base

which makes for steadiness is a long spring and wheel base, the former being always desirable and the latter desirable to an extent permitted by track curvature. In the Brill No. 21-E truck both long spring base and a long wheel base is obtained and the combination of coil springs and semi-elliptics is one which has been most successful—the Brill No. 21-E type truck being standard for single truck cars practically throughout the world. However, there are some car bodies which are too short to permit the use of the 21-E spring arrangement and for these, the Brill No. 21-C truck, which is shown in an accompanying engraving, is recommended. The truck has the Brill 21-E type of solid forged frame and is generally similar to the No. 21-E truck, but substitutes short full elliptics for the long semi-elliptics placed outside the pedestal of the No. 21-E at the ends of the truck frame. This arrange-

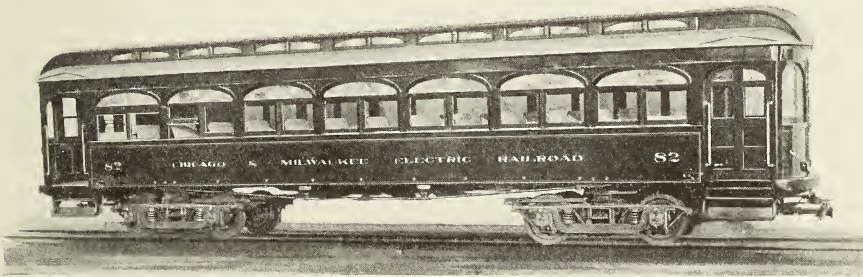
ment materially shortens the spring base, but still secures as long a wheel base and spring base as the car body will permit. The No. 21-C truck has been adopted as standard by The J. G. Brill Company for use under single truck sprinklers and short cars which preclude the use of truck No. 21-E.



EQUIPMENT FOR THE CHICAGO & MILWAUKEE ELECTRIC RAILROAD

MOTOR AND TRAIL CARS

INCLUDED in a recent shipment to the Chicago & Milwaukee Electric Railroad from the plant of the American Car Company were eight 40-ft. 6-in. vestibuled motor cars and eight 40-ft. 6-in. trail cars. Three of the motor cars are for regular passenger service and the remaining five are divided into two compartments, one for passengers and one for smokers. Otherwise the cars are generally similar in dimensions and finish with the exception that the three regular passenger cars have full empire ceilings and the combination cars semi-empire ceilings. The trail cars have the same dimensions as



EQUIPMENT FOR THE CHICAGO & MILWAUKEE ELECTRIC RAILROAD—One of the Five Trail Cars for Regular Passenger Service

the motor cars, have semi-empire ceilings and are for regular passenger service. The three motor cars for passenger service have plush upholstered seats. The seats in all the other cars are upholstered in rattan. The standard dimensions covering the three types of equipment are as follows:

Length of car body over end panels at sills	40 ft. 6 in.
Length over bumpers	52 ft. 3 in.
Length over crownpieces	51 ft. 2 in.
Width at sill including panels	8 ft. 7½ in.
Height from rail over trolley board (extreme)	13 ft. 5⅜ in.

The framing of all the cars is of uniform type and dimensions. The side sills are yellow pine 5¼ by 7-⅞ in. plated with 7 by ½-in.



EQUIPMENT FOR THE CHICAGO & MILWAUKEE ELECTRIC RAILROAD—One of Five Motor Cars With Passenger and Smoking Compartments—There Were Also Three Motor Cars for Straight Passenger Service

steel. The center sills are 6-in. I-beams. The ends sills are white oak 4¾ by 7-⅞ and the center cross joists are 2¾ by 4½ white oak. Truss rods 1¼ in. in diameter are employed. The ends of each car are protected by Brill angle iron bumpers which are supported on knees extended for the purpose. The bumpers extend from side to side and project beyond the crownpieces, affording the maximum protection to the platform.

The body framing is long-leaf yellow pine and straight-grained ash. The side posts, which are 2 by 6¼ in., are spaced 2 ft. 6¼ in. center to center. They are ash as are the corner posts, which are 3¾ in. thick. The posts are mortised into the sills and fastened with strap bolts. The roof is the steam coach type the full length of the car body



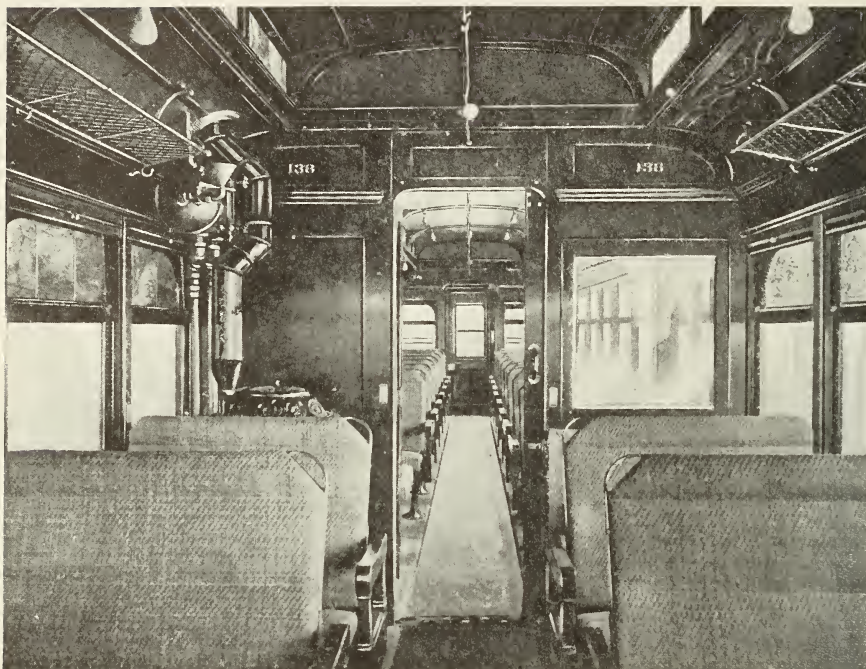
EQUIPMENT FOR THE CHICAGO & MILWAUKEE ELECTRIC RAILWAY—The Three Motor Cars for Regular Passenger Service Have Plush Upholstered Seats and Full Empire Ceilings

and has ventilator sash on each side arranged in pairs and with tops corresponding in shape to the semi-empire or full empire ceilings.

All of the cars are provided with a saloon, which, in the two compartment cars, is placed against the compartment partition. In the others it is placed in a corner of the car. In all cars the saloon is fitted with a wet hopper and there is the usual water cooler in one corner with faucet in the aisle.

The cars have mahogany interior finish including the linings, doors and moldings. The ceilings are poplar painted and decorated. The curtains are silk pantasote. Push buttons operating electric bells on the platforms are provided on each side post and all the cars have continuous basket racks. A steel and rubberoid matting is used in the aisle.

The motor cars are provided on the right hand side of each vestibule with a motorman's cab which is arranged to fold back against the end of the car body when not in use. The platforms are enclosed with



EQUIPMENT FOR THE CHICAGO & MILWAUKEE ELECTRIC RAILROAD—Interior of Smoking and Passenger Trail Car—All the Cars Have Mahogany Interior Finish

stationary round end vestibules sheathed on the outside with wood and provided in the center with a swing door with 26-in. opening. The door has a double sash, the upper one of which is arranged to drop. The vestibule step openings are enclosed with folding doors equipped with Brill door controller mechanism. The floor opening between the edge of the platforms and the vestibule doors are covered with hinged trap doors.

The special equipment of the cars includes Brill Dumpit sand boxes, Dedenda gongs, Brill signal bells and trolley retrievers, fire extinguishers and tail and head lights.

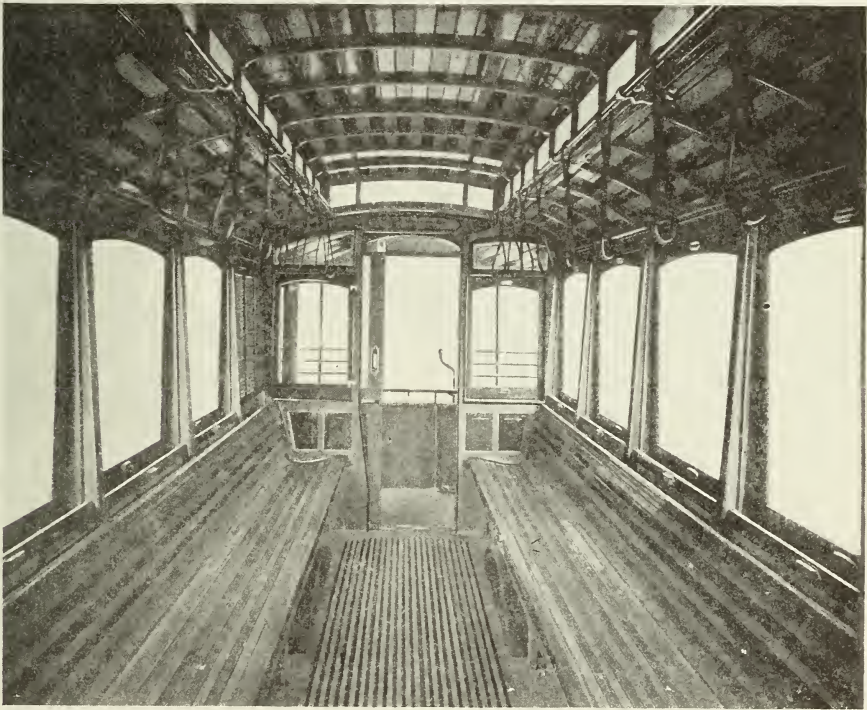


TWELVE FOOT HORSE CARS FOR PERU

CARS FOR EXPORT

FOUR closed horse cars recently shipped by The J. G. Brill Company comprise the initial equipment for a mule tramway in Cuzco, one of the more important interior cities of Peru.

The cars have bodies 12 ft. long with five drop-sash windows on each side and are mounted on Brill equalizing running gear. The interior is finished in ash and cherry, the ceiling, which is built without headlining, and the longitudinal slat seats being of alternate ash and cherry boards. Blinds with cherry frames and maple slats are provided at each window. The metals trimmings inside the car are bronze and the end windows are protected on the outside with three



TWELVE-FOOT HORSE CARS FOR PERU—The Ceiling and Seats Are Alternate Ash and Cherry Boards

bronze rods. Each platform is equipped with a Brill patented brake handle of solid bronze metal.

The equalizing running gear on which the cars are mounted has a 5-ft. 6-in. wheel base and 30-in. cast chilled wheels which have A. S. I. R. A. Wheel A flange and 3-in. tread. The cars are for use on



TWELVE FOOT HORSE CARS FOR PERU—The Car Body Was Shipped Whole With Hoods and Platforms Inside

meter gauge track and have 3-in. axles. The following are the principal dimensions of the cars:

Length of car body	12 ft.
Length of each platform	3 ft.
Length of car over platforms	18 ft.
Width of car at sills	5 ft. 1½ in.
Width of car over posts	6 ft. 5½ in.

Each car body was painted chrome yellow with silver lettering and the running gear on which the body is mounted was painted dark green.

In preparing the cars for foreign shipment the platforms and hoods were removed and placed inside the carbody which was boxed whole. In this condition each car measures ready for shipment 13 ft. 1 in. by 7 ft. 4 in. by 8 ft. 0 in. equivalent to 768.8 cu. ft. or 19- $\frac{1}{3}$ shipping tons of 40 cu. ft. each. The net weight of each car ready for ship-

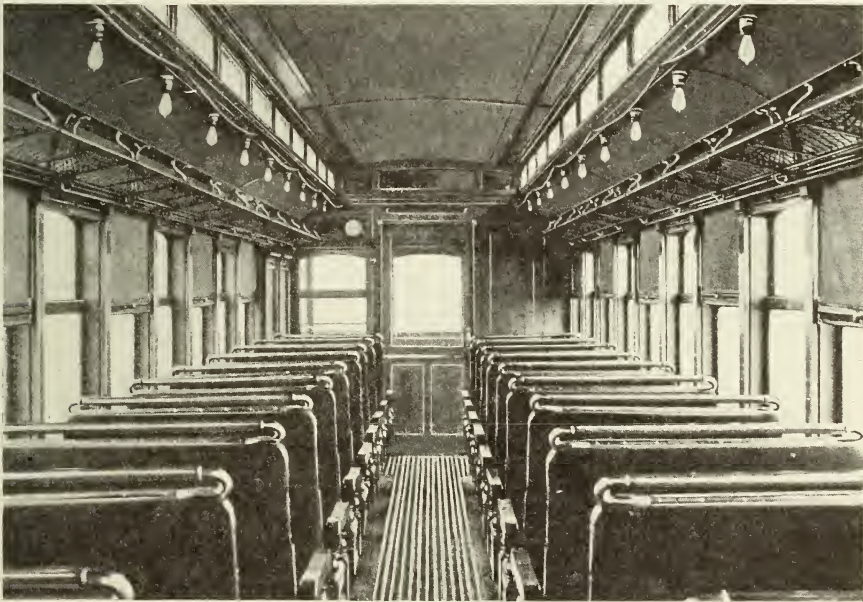
ment was 3,060 lb. or 1,390.1 kilos and the gross weight was 4,725 lb. or 2,147.8 kilos. The two pairs of wheels and axles for each car were shipped separate properly wrapped and weighed 820 lb. or 372.8 kilos each.



COMBINATION PASSENGER AND BAGGAGE CARS

EQUIPMENT FOR LIGHT EXPRESS SERVICE

ON several previous occasions in Brill Magazine, interurban cars have been described which embodied in one compartment a baggage room and motorman's cab. Two cars of that type which have recently been delivered to the Benton Harbor & St. Joseph Railway & Light Company by the Danville Car

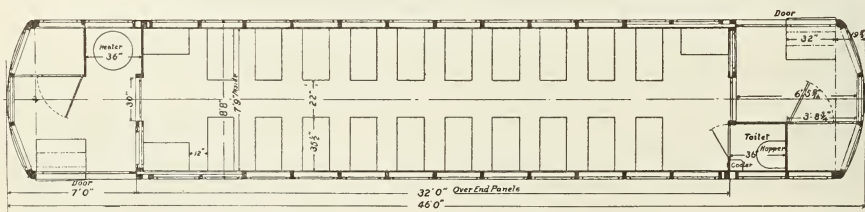


COMBINATION PASSENGER AND BAGGAGE CARS—The Passenger Compartment Seats 46 Persons and is Finished in Golden Oak



COMBINATION PASSENGER AND BAGGAGE CARS—At Both Ends of the Car There is a Compartment Which Combines the Baggage Compartment, Vestibule and Motorman's Cab

Company are shown in accompanying illustrations. They are specially adapted for handling light freight and package express and have specially arranged baggage compartments at both ends which embody the usual vestibule and have in one corner a motorman's cab. The plan of the cars, which is shown in an accompanying engraving, provides sliding doors at the step opening at diagonally opposite corners of the cars. These doors can be opened the width of the step opening or pushed back to give an opening over 5 ft. wide for loading baggage. The arrangement whereby baggage compartment and vestibule are combined secure a saving in length of car body and hence save in weight. The compartment at one end has a motorman's cab and a hot water heater on the side opposite the step opening and at the other end in the corresponding position is a motorman's cab and saloon. The saloon has a door opening directly into the passenger compartment.



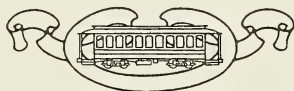
COMBINATION PASSENGER AND BAGGAGE CARS—The Sliding Doors At the Steps Can Be Pushed Back to Give a Wide Opening for Loading Baggage

The seating capacity of each car is 46 persons, there being two fixed longitudinal seats at the heater end of the car, a single longitudinal seat opposite the saloon at the other end and 20 reversible transverse seats. The following is a tabular statement of the principal dimensions of the cars:

Length of car body over corner posts	32 ft. 0 in.
Length over vestibule sheathing	46 ft. 0 in.
Length of baggage compartment	8 ft. 8 in.
Length of passenger compartment	27 ft. 4 in.
Width of car at sill	8 ft. 8 in.
Width over posts above belt	8 ft. 9½ in.

The interior finish of the cars is golden oak with 3-ply birch veneer ceilings and solid bronze trimmings inside and out including continuous basket racks in the passenger compartment.

The framing of the cars includes 6-in. I-beam center sills and 4¾ by 7¾-in. yellow pine sills which are plated with 15 by ¾-in. steel plate. The end sills and center cross joists are white oak 5 by 6½-in. and 3½ by 6-in. respectively. The cars are mounted on Brill No. 27-M.C.B.-2 truck which are equipped with rolled steel wheels 34-in. in diameter on 5-in. diameter axles. The trucks have a wheel base 6 ft. 6 in. long.



EXPRESS CAR EQUIPMENT FOR ILLINOIS

FIFTY-FOOT CARS

STEAM RAILWAYS were first built to carry passengers, but the steam railways long ago discovered that a really profitable business can not be built on passenger traffic alone. The interurban electric railways with their cheaper construction and lower cost of operation have not yet found the serious need of a large volume of freight and express traffic and most of them have directed their efforts towards the stimulation of passenger traffic rather than

towards a development of freight and express business which will bear the same relation to the passenger traffic as the freight business on steam railways. We firmly believe that the interurban electric railways are destined to form a part of a systematic organization of transportation lines which will embody the existing steam lines (which no less an authority than Mr. George Westinghouse says are on the eve of



EXPRESS CAR EQUIPMENT FOR ILLINOIS—There is A Corner Door End And a Motorman's Sliding Door At Both Ends of the Car

their electrification) and the interurban electric lines and that car interchange, interline tickets and through routing of freight will be a result. If such a condition is to come, interurban electric railways should begin to prepare for it by standardization and in other ways.

One instance where there is apparently a vision of the future of electric railways, where there has been a studied effort to develop freight and express business and to anticipate the relations with the steam railways which we believe are bound to come, is on the interurban electric

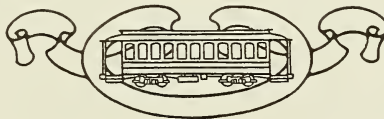
railway lines of which Senator William B. McKinley is the executive head. To the Chicago, Ottawa & Peoria Railway, one of his properties in Northern Illinois, the Danville Car Company has recently delivered two 50-ft. express cars which are shown in an accompanying



EXPRESS CAR EQUIPMENT FOR ILLINOIS—The Chicago Ottawa & Peoria Railway is a Northern Illinois McKinley Property

engraving. The cars correspond closely to steam railway equipment. They have steam coach type roofs, M. C. B. drawbar heads and trucks. There is a single sliding door of ample proportions, a motorman's door and two windows on each side of the car. The ends are full vestibule and have swinging doors in diagonally opposite corners.

The interior of the cars is finished in ash, the sides being sheathed their full height. The ceiling is left with car line finish. There is a partition of iron pipe at both ends of each car and the heater which forms part of the equipment is protected by iron pipe uprights. Each car is supplied with a wall desk.



TRAIL CARS FOR PAY-AS-YOU-ENTER OPERATION

EQUIPMENT FOR NORTHERN TEXAS

THE prepayment type of car has come to stay in the United States. It is no longer an experiment and there is no question of its success from a number of standpoints. Its adoption on every road seems only a question of time. There remains its adaptation to different conditions and the evolution of those features which result in a variety of types of prepayment cars at present. Already the use of the prepayment arrangement is being extended from the standard city car to cars of other types. For instance on another page of this issue some open Pay-As-You-Enter cars are described and the accompanying illustrations show a Pay-As-You-Enter trail car of which seven were built by the American Car Company for the Northern Texas Traction Company.

The cars are unique in arrangement as may be seen from the accompanying floor plan, being of the single end type with a smoking compartment at the rear. There is the equivalent of round end vestibules at both ends but virtually no bulkheads. The front end of each car has a drop platform but at the rear the car has a floor level with that of the main compartment. The roof is the type known as the "turtle

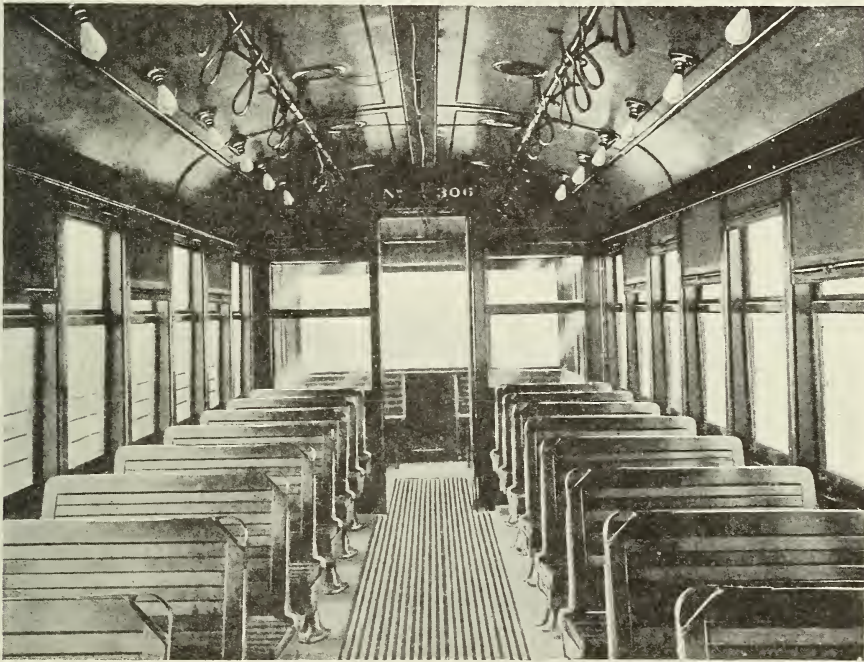


TRAIL CARS FOR PAY-AS-YOU-ENTER OPERATION—The Cars Were Built by the American Car Company Under License from the Pay-As-You-Enter Car Corporation And Are Mounted on Brill No. 420 Trail Trucks

back" or plain arch without deck sash. The following are a few of the principal dimensions of the cars:

Length over dasher sheathing	39 ft. 0 in.
Length over bumpers	40 ft. 6 in.
Length over corner posts	31 ft. 8 $\frac{3}{4}$ in.
Width at sills over sheathing	8 ft. 5 in.
Height inside from top of floor to under side of head lining	7 ft. 6 in.

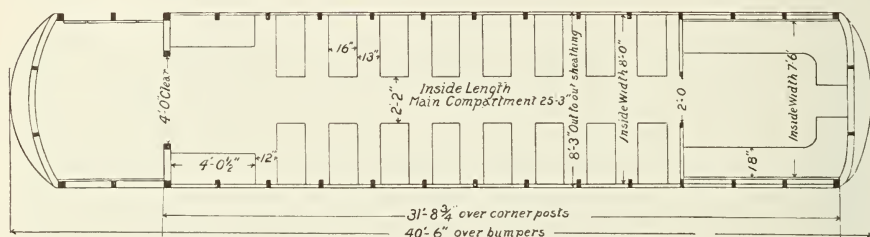
The bottom framing is somewhat unusual in design, the only longitudinal members being the 4 $\frac{1}{2}$ by 7 $\frac{3}{4}$ -in. yellow pine side sills which



TRAIL CARS FOR PAY-AS-YOU-ENTER OPERATION—The Exit from Compartment for Smokers At the Rear is Through the Regular Passenger Compartment

are reinforced at the bolster with 6 by 4-in. angle iron (12.3 lb. per ft.) 5 ft. long. The end sills and cross framing are white oak and reinforced on one side with 4 by $\frac{3}{16}$ -in. steel plate with a 6-in. foot at each end bolted to the side sill with a $\frac{5}{8}$ -in. rod. On the opposite side there is a $\frac{1}{4}$ by 4 by 6 by 6-in. angle iron bolted through the cross sills and side sills. There is a 1-in. under truss rod beneath each side sill. The bolsters are made from 8 by 1-in. steel with cast fillers.

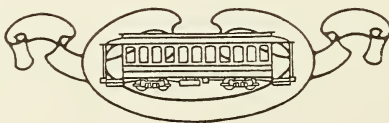
The inside finish of the cars is mahogany except from the truss plank to the window rail which is No. 18 sheet steel painted to conform to the interior finish. The sash moldings and all interior finish is rubbed and is perfectly plain. The ceiling is composite board painted green, rubbed and varnished. The trimmings throughout are oxidized solid bronze. The vestibule doors are arranged to suit the Pay-As-You-Enter system. The seats are stationary with alternate oak and



TRAIL CARS FOR PAY-AS-YOU-ENTER OPERATION—The Main Passenger Compartment Seats 36 and the Smoking Compartment 14

cherry slat backs and seats. The curtains are pantasote on spring rollers. The smoking compartment is furnished in every way the same as the rest of the car and is separated from the main compartment by a single swing door 14 in. wide on double acting hinges.

The cars are mounted on Brill No. 420 trail trucks with a 4 ft. 6 in. wheel base. Cast chilled wheels are used and A. S. I. R. A. standard brake shoes and axles.



BRILL MAGAZINE

Published on the fifteenth
of each month by the

PUBLICITY DEPARTMENT OF THE J. G. BRILL COMPANY

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OVER in Great Britain and elsewhere in Europe where electric railway practice is held more or less in contempt by some of us wise Americans, they are beginning to adopt the car meter as a means for securing a reduction in current consumption. It appears that investigation with the car meter has shown some remarkable things, among them that for the same conditions one car crew will use an inordinate amount of current as compared with another crew. Car meters have also made possible a comparison at the car of operating costs of various types of equipment. With respect to the use of car meters as a means of reducing current consumption, it has been found possible to secure better service from motormen both because the meters afford a definite check on each man's ability and because the meter is an instrument which makes it possible to show each man in a definite way the consequence of his

deeds or misdeeds. In this country the extent of our efforts to secure minimum current consumption have rested in a course of instruction in a school maintained for prospective employees. A part of the course is usually a lecture or series of lectures on methods of control operation with respect to current consumption. Sometimes the instruction in this particular branch of car operation is given by an old employe whose theoretical knowledge in an elementary way may be correct, but whose methods of demonstrating them in practice may lead to an extravagant method of operation by a large number of men. To some extent a check is placed on the consumption of energy by circuit breakers and such devices as special controller handles, though those devices are more in the nature of insurance for the electrical equipment. But for the most part no systematic studied effort has been made in this country to place a check on that source of expense and possible loss—the current consumption at each car. Presumably the manufacturers abroad have been able to produce a car meter which is comparatively low in cost. Now, if such is the case, is not the use of such a device as wise an investment as one in cars of the prepayment type? It appears as though the adoption of an instrument of the sort would check the outgo or expense of car operation, the prepayment feature being a check on the income.

THERE is much that we can learn from our British and Continental cousins in the electric railway business. We will concede because of the fact, for the sake of argument, or as balm to our American pride, that American electric railway practice, by and large, is in advance of any other. Yet the fact remains that from the standpoint of economy, in many respects in operating efficiency and in certain engineering features we are decisively outstripped. For instance, in Glasgow in 1909 the average fare paid by all the passengers was 1.82 cents per ride, yet the management of the Glasgow tramways paid \$316,745 during the year as interest on capital; sinking fund \$350,615; income tax to the National Government, \$52,220; put aside for general reserve fund \$81,375; and then turned into the city treasury \$250,000. Neither municipal ownership or the Englishman's bigger dollar can alone or together account for a record of that sort which spells efficiency of management in large letters. Yet the conditions in Glasgow are not exceptional—they merely emphatically emphasize a general distinction between British and American electric railways. Again from the standpoint of operating efficiency as viewed by the general public, we wonder how the rule of "a seat for every passenger" which is frequently encountered abroad would affect the financial status of some American electric railways. Consider

some of the engineering features. At present there are reams written on the subject of light weight cars and their economy, yet for years our British cousins have operated cars which in weight per seated passenger and in total weight have made our best efforts look only fair. Verily let us study British management to better advantage and if necessary swallow some of our American pride. The application of some foreign methods may save many a dollar.



AMONG the features of British and Continental car construction which offer particular food for thought at the present time in connection with American problems are underframe and roof construction. Not only on electric railways but on steam railways, foreign car builders have adopted a construction which in the main is a most substantial underframe and an extremely light body frame—the latter being frequently referred to in this country as a veritable tinder box. Certain it is that in a fairly large number of wrecks on foreign steam roads the underframe of an entire train of cars, or in collisions even two trains of cars, have been practically uninjured but the body framing has collapsed like a pack of cards. In England wrecks and collisions are so rare that the resulting casualties and disadvantages of this type of construc-

tion are not an important factor, features of economy of operation, economy of construction, the low center of weight which is secured and other points being more important considerations. In this country on steam railways wrecks are so frequent an occurrence that as a measure of economy, not only the underframe but the car body must be made to withstand severe injury and fire, and for these reasons largely and to secure more permanent construction the all-steel car has come into existence. The electric railways have begun to follow this lead and steel is being used in electric car construction in increasing quantity. Now no two authorities can be found who will agree, every man is entitled to his opinion, there are present good arguments on both sides of the question and conditions in future may change, but we believe there will be a reaction from the all-steel car and that the steel underframe to give strength and long life, and a light body framing largely of wood construction is the logical thing both for steam and electric railway cars of comparatively large size. This opinion is based on the presumption that all-steel construction will not secure a sufficient increase in life over a steel underframe and wood upper or body frame construction to warrant its cost from that standpoint; that with the introduction of proper safeguards, better construction of roadbed, greater operating efficiency, there will be re-

moved the need of the all-steel car from the standpoint of safety to passengers and equipment; that operating economy will require lighter equipment.



THE mortality of projected electric railways is something frightful. The financial editor of *World's Work* in an interesting article entitled "The Westerner and His Trolley Line" estimates that nine out of ten of such projects are still-born. Possibly he is correct if there are taken into consideration all of the paper roads which never attain sufficient life to attract newspaper comment. Our own observation leads us to place the death rate of the roads which reach the stage of incorporation at about 75 per cent. with a good portion of those which finally materialize in a practically dormant condition for from two to five years before rails are laid. Of the roads that finally reach maturity it is stated that a few find backing in the banking field in Philadelphia, Boston, Chicago, St. Louis, and, occasionally, in New York. Of the rest a few are built on popular subscription in the towns along the route. The rest are financed and built by home money. Appeals to us from projected roads for financial assistance are quite frequent and the other large manufacturers in the equipment field also re-

ceive them. To these roads we can only lend our moral support in case they are legitimate projects. Yet it is almost always a difficult matter to convince the promoters that a business the size of ours requires for operating expenses, fixed charges and extensions, all the capital which it can command and that there is none to spare for outside projects even as closely related to our own welfare as is the success of theirs. The merit of their proposition is so strong in their eyes that the statistical evidence we may be able to offer that we have one chance to win as against nine to lose has no weight with them. Nor does the fact that if we lent support to them we would be under moral obligations to be of like assistance to the next project. Almost invariably the money at home among the immediate acquaintances of the projectors is the mainstay of a proposed electric railway and we shall be glad at any time to suggest methods by which it may be raised.



FIFTY cents spent for a copy of Lorin F. Deland's "Imagination in Business" will probably suggest to many a general manager or traffic manager means of developing business of which he may have no conception at present. Not that Mr. Deland outlines any specific application of imagination to the electric railway busi-

ness, but his accounts of methods by which business has been developed in other lines and by which concerns have been lifted out of the slough of despond or off the financial rocks are so suggestive of the means which must be employed in the "creation" of business, that every electric railway man will receive a mental tonic. Imagination is a need in every business. It is a striking need of every big business—and nearly every electric railway is big in the sense of its responsibility to a large number of people. Imagination as defined by Mr. Deland is the opposite of analysis. It is synthesis. It involves a knowledge of all of the elements in the business and of their relation one to the other. A knowledge of human nature, of psychology, economics and history can be usefully applied in the exercise of imagination. Imagination creates an excursion passenger traffic such as that of the Twin City Rapid Transit Company with all its ramifications of special suburban lines, lake steamboat service and amusement parks. The value of the imagination which created the famous Hi Jinks, whose fame has extended from Minneapolis almost across the continent, can scarcely be measured in the dollars and cents of increased passenger travel or in the value of the good will which it creates. "Imagination in Business" will not give you a Hi Jinks but it will give you fifty cents worth of mental exercise and enjoyment.

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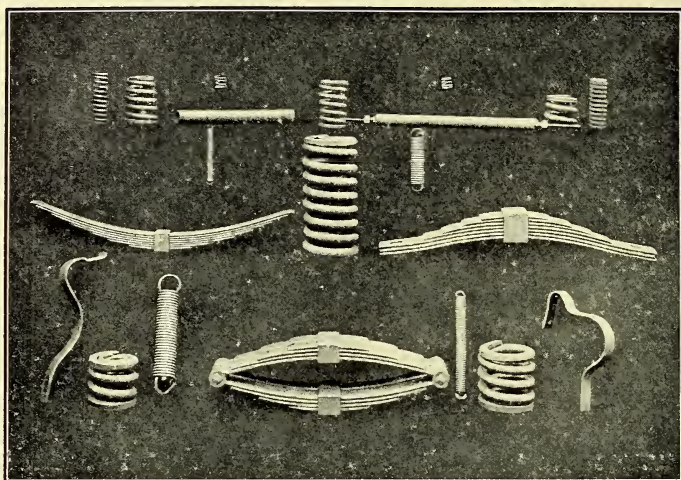
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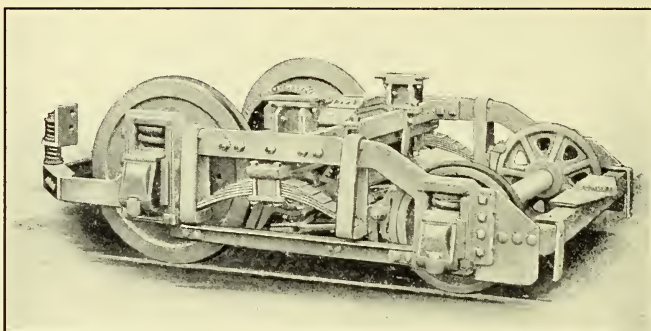
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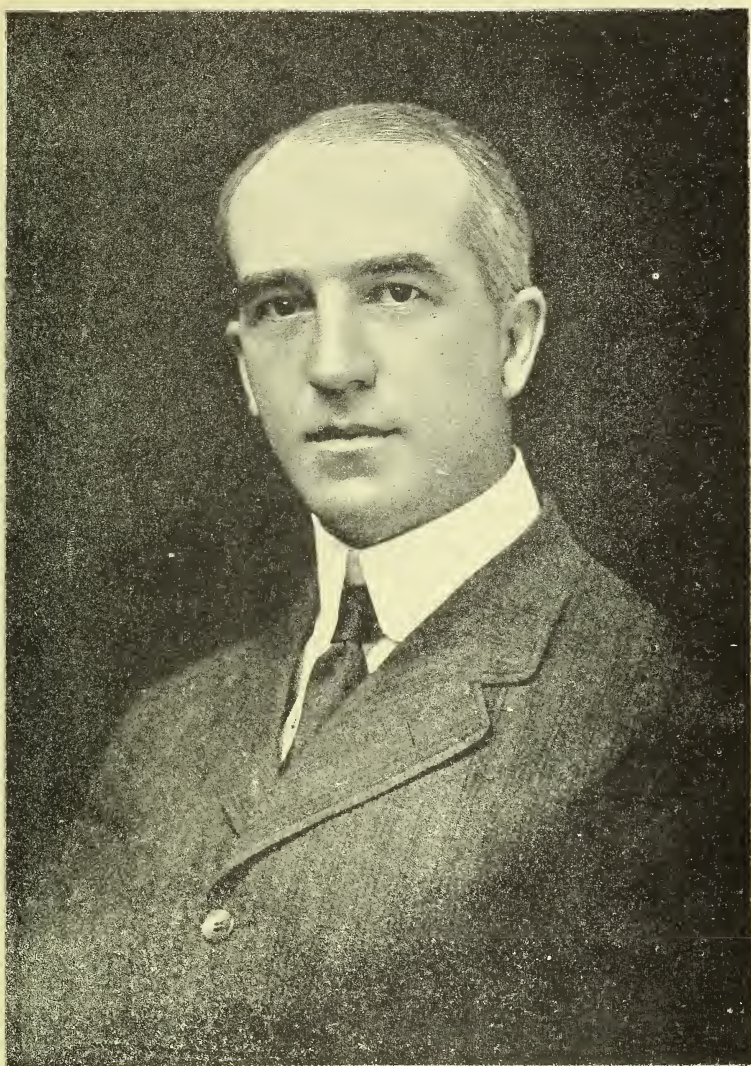




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P. S. Arkenwright



BRILL MAGAZINE

Vol. IV

AUGUST, 1910

No. 8

PRESTON S. ARKWRIGHT

[WITH PORTRAIT INSERT]

PRESTON S. ARKWRIGHT, president of the Georgia Railway and Electric Company, was born February 24, 1871, at Savannah, Ga. At the age of eight he was sent to St. Joseph's Academy at Sharon, Ga., where he began a school career which ended in his graduating from the University of Georgia in 1891. The final year of this period he devoted to the study of law in the university law school. Armed only with his diploma he went to Atlanta and built up a law practice which ten years later brought him prominently before the public in one of the most important legal battles for franchises ever fought in Georgia. Mr. Arkwright was engaged on the side which finally united all the contending interests, including the street railway and electric lighting systems of the city, in the Georgia Railway and Electric Company. For several years prior to the consolidation the street railway had enjoyed neither prosperity nor extreme popularity with the public, and it was necessary to the success of the consolidated enterprises that the management should be capable of satisfying both the public and stockholders. For this task Mr. Arkwright was selected, because he was familiar with the histories of the several companies and their franchises and also because in his law practice he had demonstrated a capacity for thoroughness and earned a reputation for straightforward dealing. He became president at the time of the organization of the company in 1902, and it has continued to grow each year in prosperity and popularity. The company under his administration has become noted for the courtesy of its employees, its excellent service and its fair and liberal treatment of the community it serves.



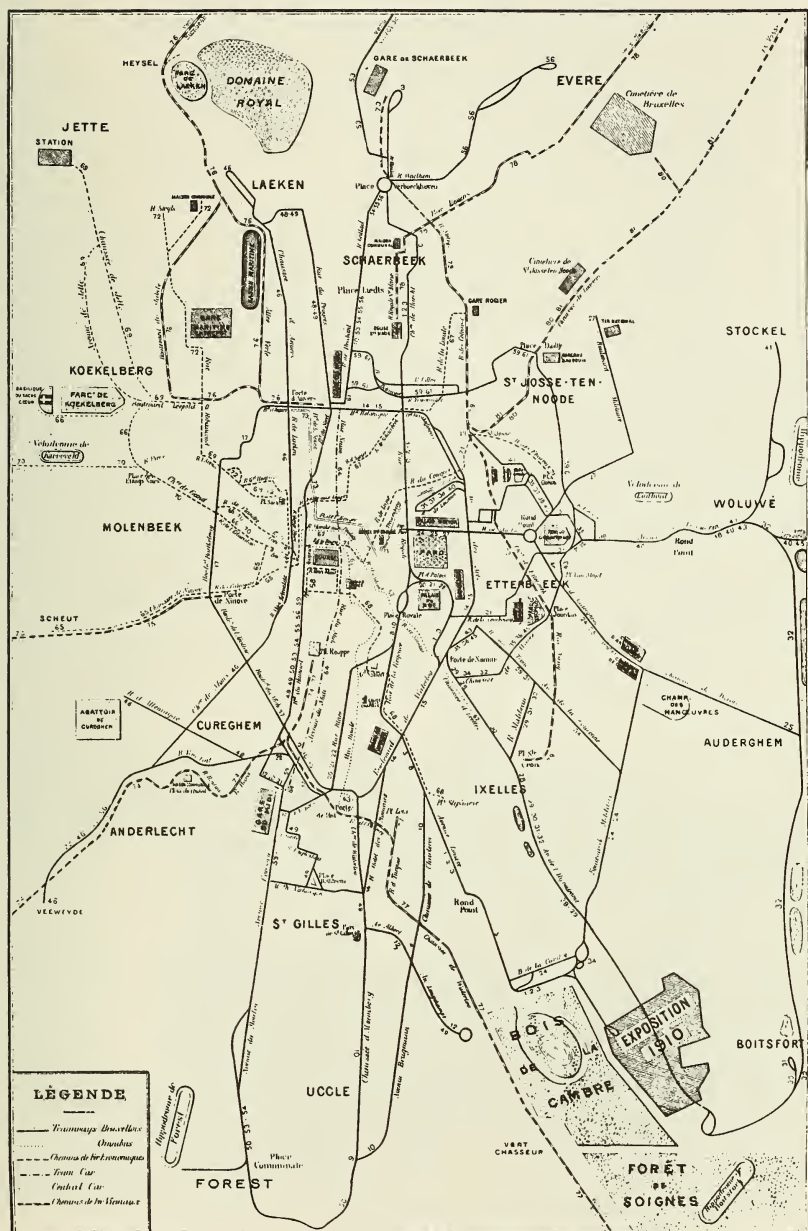
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

BRUSSELS, BELGIUM *

BRUSSELS has a population of 700,000 and two tramway companies, the Tramways Bruxellois and the Chemins de Fer Economiques. The Tramways Bruxellois or Brussels Tramway Company has 850 single truck cars with first and second class compartments. Loose plush upholstered cushions are the distinguishing feature of the first class compartment, both compartments being provided with longitudinal seats. There is an extra charge of 5 centimes (one cent) for first class passengers. The rate of fare is based on the section or zone system, the charge for two sections being 10 centimes and for more than two sections 15 centimes. On the Chemins de Fer Economiques there is used a very simple type of car with longitudinal seats. The truck on which the car is mounted is similar to Brill No. 21-E truck and is quite a striking example of the extensive imitation abroad of certain Brill trucks which were not protected by foreign patent rights when the Brill Company first entered the truck field. These imitations are a sincere tribute to the merits of the Brill design and are universally called Brill "Type" trucks. The distinction between a Brill "Type" truck and a truck made by the J. G. Brill Company lies in the high class workmanship and material employed by the J. G. Brill Company which has established Brill trucks as standard throughout the world. The J. G. Brill Company urges managers and engineers in their own interest to differentiate strongly between the trucks made by the J. G. Brill Company and bearing their name plate and shop order number and copies of the Brill truck embodying inferior material and workmanship and sold as the Brill "Type" of truck.

The Brussels Tramway Company uses a variety of trucks some of which are the Brill 21-E type and others a built up type entirely foreign to America, as will be noted from an examination of the ac-

* This is the twentieth in a series of articles, each of which discusses the tramway system of some important city of the world with particular reference to the type of car which is used.

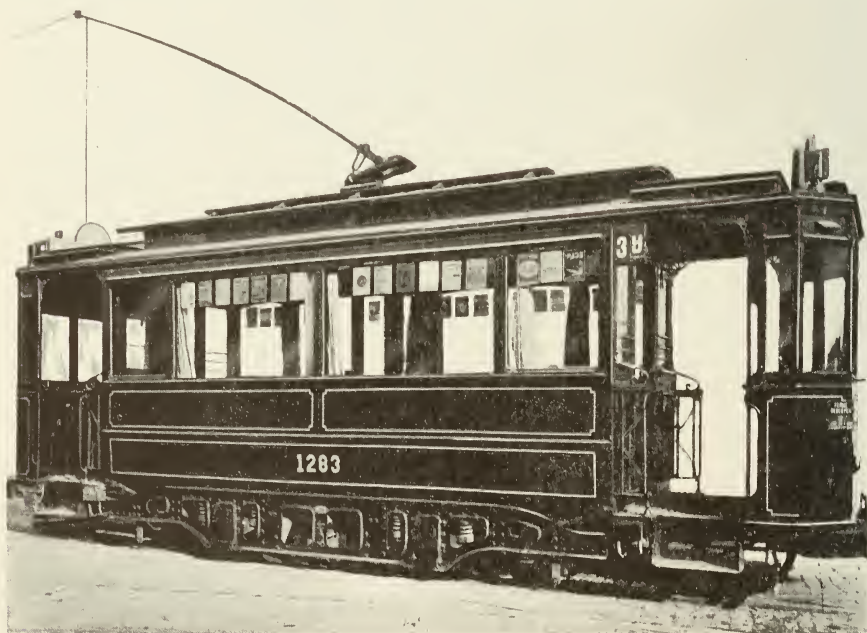


CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Map of Brussels, Showing Steam and Electric and Omnibus Lines

companying engraving. The standard car of the Brussels Tramway Company has the following principal dimensions and features:

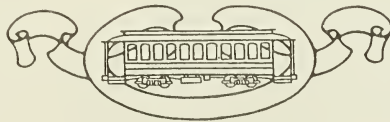
Length over end panels	17 ft. 0 $\frac{3}{4}$ in.
Length over platforms	27 ft. 10 $\frac{5}{8}$ in.
Length over all	28 ft. 10 $\frac{1}{2}$ in.
Width over sills	7 ft. 2 $\frac{3}{8}$ in.
Weight	
Car body	11,455 lb.
Truck	6,980 lb.
Motors and electrical equipment	8,240 lb.
	<hr/>
Total	26,675 lb.
Motors	Two 60-43 hp.

Ask the manager of nearly any European tramway why the short single truck car such as used in Brussels is best adapted to his requirements and in all probability he will tell you that the frequent stops make it impossible to operate longer cars with only one conductor. This explanation without elaboration means nothing to an American



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Standard Car of the Brussels Tramway Company Has a First and a Second Class Compartment—The Platforms Are Five Feet. Five Inches Long

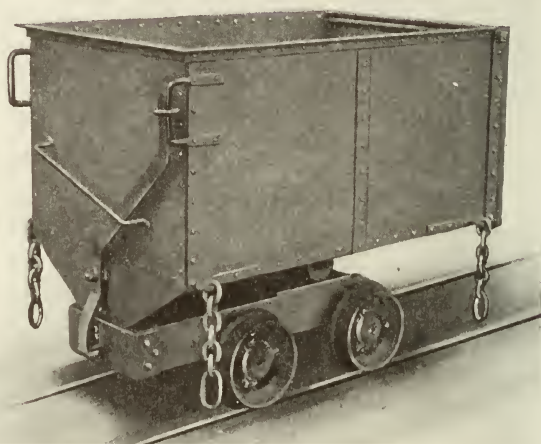
manager who previous to the advent of the prepayment car had been accustomed to operating much longer cars with a single conductor. But the zone system is an important consideration. Under that system of fare collection either of two methods must be employed. A collection of fares must be made at the beginning of each zone as on some interurban lines in this country or a fare receipt must be given when the passenger boards the car, the receipt to be surrendered when the end of the ride is reached. Either method requires more time than the American city practice of collecting a uniform fare of five cents for a ride, regardless of its length. When considering the zone system of fare collection and comparing it with zone operation or interurban lines in this country it should be recalled that the European city zone is much shorter than the American country zone. Furthermore the European tramway rider is characteristically a short haul passenger and consequently stops are frequent and while making a zone collection the conductor must at the same time care for the passengers boarding and alighting and also collect their fares. When the practice of giving a fare receipt is employed, the conductor must punch a ticket indicating the point at which the passenger boarded the car and note the fare paid. He must see that passengers alight at the proper point, thus acting both as collector of fares under a more complicated system than the American and also as an auditor of tickets which passengers hold. It is not known which system of fare collection is employed in Brussels, but as the zone system is in vogue, the explanation that a longer car would require more than one conductor seems like a plausible one.



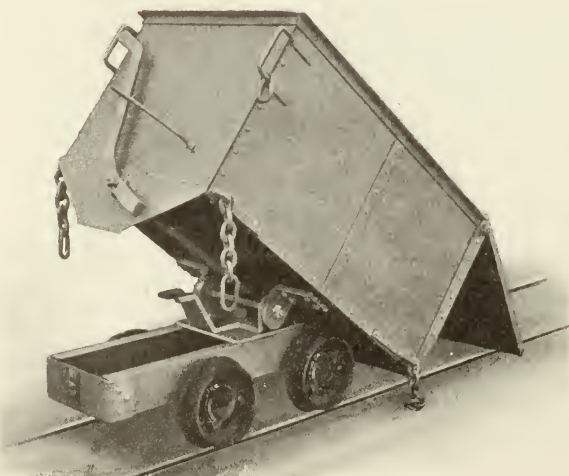
ALL-STEEL MINE CARS FOR MEXICO

THREE-QUARTER YARD CAPACITY

THE plant of the Danville Car Company is equipped to build all-steel cars and included in its output are ore cars for mines. One type of that class of equipment is shown in the accompanying engraving. The cars have been built for several different track gauges and a number of



ALL-STEEL MINE CARS FOR MEXICO—The Car is 41½ Inches High Over All

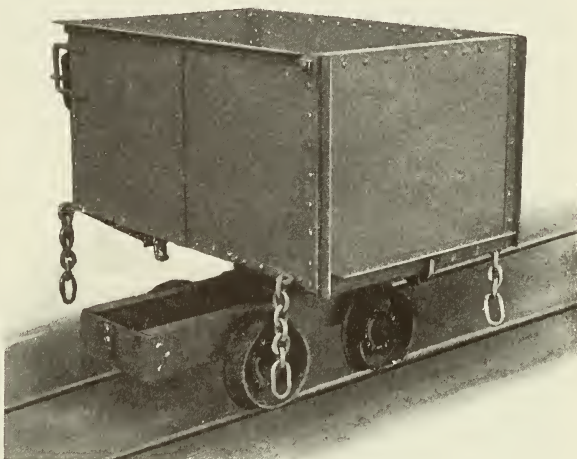


ALL-STEEL MINE CARS FOR MEXICO—The Lever at the Front Latches the Back and Locks the Car Against Dumping in Transit

mines in Mexico. They have a capacity of approximately three-quarters of a yard each, the car body measuring 24 by 48 by 30 in. inside. The sides, end and door of each car are made of $\frac{1}{8}$ -in. steel plate and the floor is $\frac{1}{4}$ -in. plate. The principal reinforcing is steel angles. The door at one end for emptying the cars

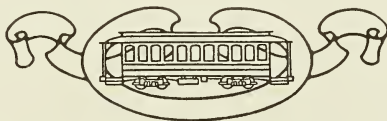
is hinged at the top and provided with a latch at the bottom. At the other end to secure the cars against dumping while in transit there is a lever which can be locked in position by a ring.

The truck frame is made from steel channels and plate and the steel hopper which is mounted on it is pivoted so that the hopper can be turned on the frame and emptied on either side of the track or at the back. Both the vertical and horizontal pivots are located in the same plane $1\frac{1}{2}$ in. back of the center of the car as a safeguard against accidental dumping. The cars are provided with simple chain couplers at all



ALL-STEEL MINE CARS FOR MEXICO—The Car Can Be Turned to Dump at Either Side or the Back

four corners and with all necessary grab irons. When built for track not exceeding 20-in. gauge the cars have had an 18-in. wheel base and 10-in. gray cast iron wheels which have screw caps and an oil reservoir. With this running gear the measurement from top of rail to top of car is $41\frac{1}{2}$ in. The car shown in the engravings in condition for shipment weighed 680 lb. The net weight is slightly less.



SINGLE-END PAY-AS-YOU-ENTER-CARS

EQUIPMENT FOR WICHITA, KANSAS

FOUR single-end 28-ft. closed Pay-As-You-Enter cars which have recently been completed by the American Car Company for the Wichita Railway & Light Company of Wichita, Kansas, exhibit a rear platform arrangement of rather unusual type. Each platform which has the standard Pay-As-You-Enter feature is unvestibuled, but has a conductor's cab. The cab extends from the step to the entrance doorway and encloses the exit at the rear as well as the exit portion of the step opening at which there is a two section folding door under control of the conductor. The conductor's cab is fitted with drop sash for convenience in collecting fares, which

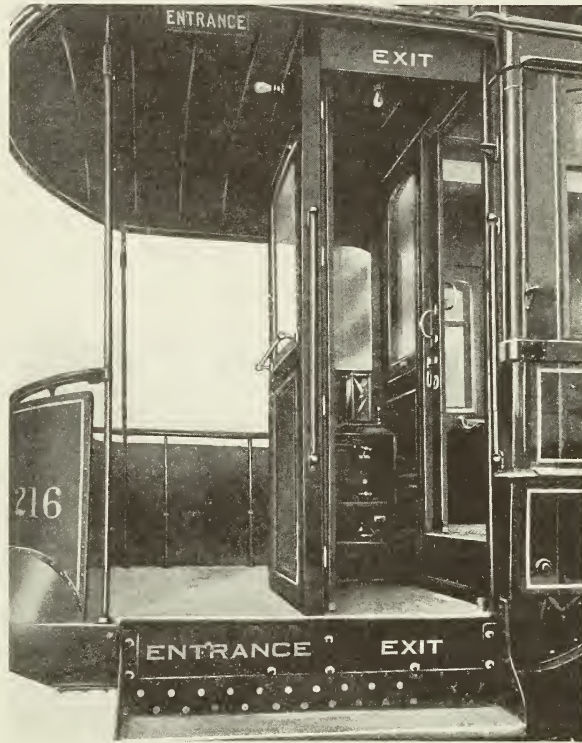


SINGLE-END PAY-AS-YOU-ENTER CARS—The Golden Oak Interior Finish With Border Inlay and the Rattan Upholstered Seats Make an Attractive Interior

in this case is done with a Brill No. 2 fare box. The arrangement protects the conductor from the elements, reduces the weight of the rear platform considerably and has advantages in case smokers are allowed to stand on the platform.

The front platform is the same length as the rear platform, 6 ft. 6 in. but is entirely vestibuled. The sliding door at the step exit is next to the bulkhead of the car instead of at the front of the platform, an arrangement which has both advantages and disadvantages. Its location with respect to the exit door in the front bulkhead provides a plan of "easy access" and affords more protection to the motorman from drafts when the door is open. On the other hand the drafts have more direct passage into the car. The location of the step exit it appears also makes it more difficult for the motorman to see when the step is clear.

The seating capacity of each of the Wichita cars is 34 persons, there being 13 transverse and 2 longitudinal seats arranged as shown in the accompanying floor plan. The seats are upholstered in Brill woven rattan, the management having adopted that long wearing and sanitary seating material in preference to carpet or imitation leather. The interior finish of the cars is golden oak with inlaid border line. The ceiling is simply decorated three-ply birch veneer. The curtains



SINGLE-END PAY-AS-YOU-ENTER CARS—Fares Are Collected With A Brill Fare Box—A Two-Panel Folding Door Closed the Step Exit

EQUIPMENT FOR THE HAWAIIAN ISLANDS

FIFTEEN-BENCH OPEN CARS

AN export shipment of cars 47 ft. long requires consideration of the design and construction with respect to the dismantling and packing for ocean transportation. Wherever possible the sills are made continuous and if necessary are shipped on deck. But the sides, roof and other parts which extend from end to end of the car are usually made in two or three sections.



EQUIPMENT FOR THE HAWAIIAN ISLANDS—The Cars Were Dismantled and Packed in Well Constructed Cases

The 47 ft. cars for Honolulu, however, had the sides, which were 34 ft. 6 in. long between centers of corner post, shipped in a single section, four sides to a box as shown in an accompanying engraving.

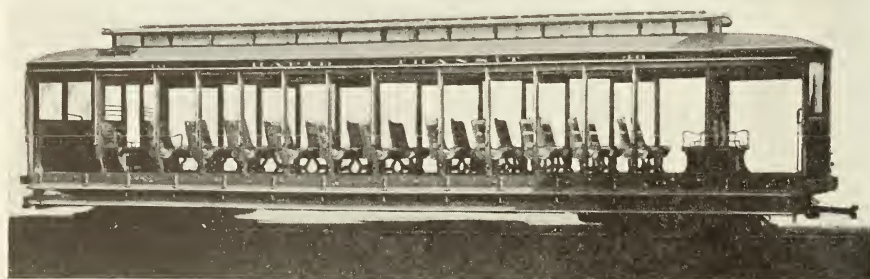
The cars in question were ten in number and were 15-bench center aisle open cars on Brill No. 39-E trucks. They have both vestibules and bulkheads with drop sash and against each bulkhead are two fixed benches. The remaining 11 benches are reversible. The measurement between vestibule and bulkhead is 5 ft. 6 in. inside at the center of the car, giving ample exit and entrance room at the ends when all

of the benches along the side are filled with seated passengers and crowding through to the aisle is so objectionable. Near the middle of the car two of the posts are spaced 3 ft. 9 in. center to center as against 2 ft. 7 in. elsewhere providing an entrance and exit aisle at that point also.

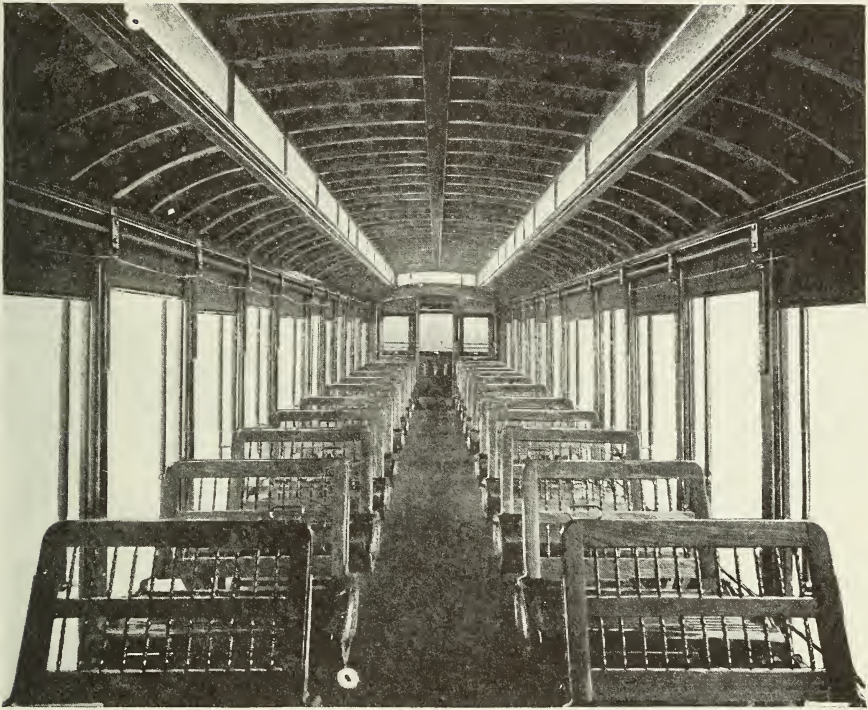
The cars are built for 4 ft. gauge track and have the following dimensions and features:—

Length of car body between centers of corner posts	34 ft. 6 in.
Length of car body between vestibule corner posts	43 ft. 7 in.
Length of car over buffers	47 ft. 0 in.
Width over sills	7 ft. 9 in.
Width over posts and seats	8 ft. 6½ in.
Height from floor to center of monitor	8 ft. 2½ in.
Seating capacity	60 persons
Weight	
Car body less electrical equipment	26,455 lb.
Trucks less gears	5,100 lb.

The driving wheels of the No. 39-E trucks on which the cars are mounted are 33 in. in diameter and the cars have double running boards. The posts of the car are ash and the inside finish is cherry and ash. The ceiling has carline finish with the alternate poplar and basswood board showing, the poplar boards being stained cherry. The Brill Winner reversible seats have ash frame and spindle backs and seats with alternate cherry and ash slats. Each seat is 2 ft. 11½ in. long over all and the center aisle is 2 ft. 1 in. wide. Push buttons are provided on each post.

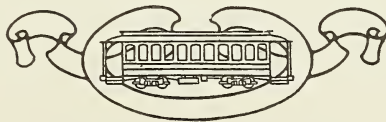


EQUIPMENT FOR THE HAWAIIAN ISLANDS—There Were Ten Cars of the Fifteen-Bench Double Running Board Type Shown Above Which Were Shipped to Honolulu



EQUIPMENT FOR THE HAWAIIAN ISLANDS—The Seating Capacity of Each Car is Sixty Persons—The Aisle is 25 Inches Wide and Affords Ample Standing Room

The end walls or bulkheads have windows which drop flush with the framing. The passageway between the vestibule and the car has a pantasote curtain. There are also pantasote curtains extending from the water table to the floor. The underframing comprises 7-in. I-beam side sills with yellow pine fillers and white oak crossings and crown-pieces.



CARS FOR THE NORTHERN OHIO TRACTION & LIGHT COMPANY

SUBURBAN EQUIPMENT

SIX suburban cars for the Northern Ohio Traction & Light Company show a number of unusual features. The most conspicuous of the innovations comprehended in the design of the cars is in the window arrangement. By omitting the usual letter panel and utilizing the space for arched-top sashes which span each pair of windows, a greater height is secured for the windows. The arched-top sashes, it will be understood, are for appearance only,



CARS FOR THE NORTHERN OHIO TRACTION AND LIGHT COMPANY—One of a Lot of Six—Mounted on Brill No. 27-M.C.B. Trucks

and are not seen from within the car. The practice, followed by all builders in connection with cars having the twin-window plan, of placing low windows under the long arched sashes, has the serious objection of darkening the interior. The arched-top sashes are almost invariably covered with curtains; even if the curtains are raised their full height, comparatively little light is admitted through the art glass with which these sashes are glazed. Besides reducing the light, the low windows limit the outlook of passengers and cut off almost entirely the view of those who may be compelled to stand in the aisle. In the window design of the car illustrated, the graceful effect of the arched-top twin-window arrangement is secured to the exterior without sacrificing light and view.

Another of the special features is the side construction. A 30 by $\frac{5}{16}$ -in. steel plate reinforced with angles at top and bottom and extending the full length of the car body, constitutes the principal side member. The plate is covered by a truss plank made of boards of full length sections, tongue-and-grooved and glued together and bolted



CARS FOR THE NORTHERN OHIO TRACTION AND LIGHT COMPANY—Smoking Compartment Seating Sixteen Passengers

to the plate after a thick paste of white lead whiting is applied. Over this plank is placed the outer sheathing of tongue-and-grooved poplar boards, glued and nailed securely. The builders devised this construction to avoid the usual side wall trusses and braces which are bulky and reduce the interior width of the car. In this case $5\frac{1}{2}$ in. was saved.

Particular attention was given to secure the most sanitary conditions possible and to this end all carvings, grooves and small recesses were eliminated from the interior woodwork; the aisle is covered with in-

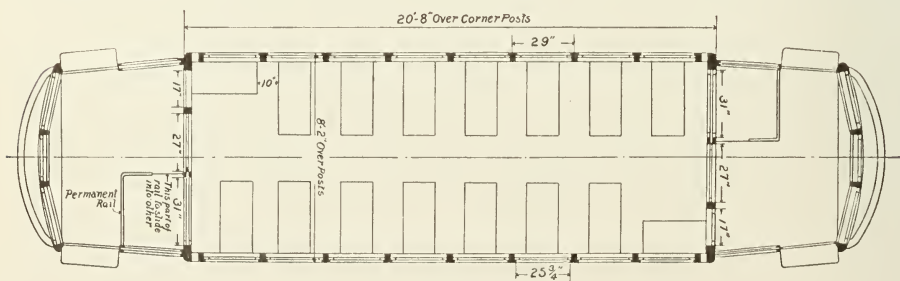
terlocking rubber tiling, $\frac{3}{8}$ -in. thick. A single marble slab 2 in. thick and set in cement forms the floor of the toilet room. The slab is recessed and is provided with a drain outlet. The walls are entirely covered with enamelled metal and the room is provided with a disinfectant and globe ventilator.

The plate glass in the door of the partition which separates the two compartments and in the end and vestibule, is brought down to 22 in. from the floor, adding much to the attractiveness of the car. Passengers have the advantage of an unusually open view ahead, the windows being cut low for that purpose. The floor of the motorman's cab is covered with a perforated rubber mat. A folding theater chair is placed on the right side for use of inspectors or officials. Air blasts are used in place of signal bells. Among the items of Brill manufacture are seats, automatic vestibule door controllers and bumpers.



PREPAYMENT CARS FOR MEXICO EQUIPMENT FOR CHIHUAHUA

CHIHUAHUA is the first city in Mexico to adopt the Pay-As-You-Enter car. The initial shipment for the progressively managed property in that city of which Sr. Enrique Creel is the president, was four 20 ft. 8 in. Brill patented semi-convertible cars built by the Danville Car Company and mounted on Brill No. 21-E trucks. The cars which were constructed under



PREPAYMENT CARS FOR MEXICO—The Cars Are Operated in the Usual Pay-As-You-Enter Manner
Part of the Equipment of Each Car is a Brill Fare Box

license from the Pay-As-You-Enter Car Corporation are shown in accompanying engravings and are an interesting example of the adaptation of the prepayment plan to short cars for roads in the smaller cities.

Instead of having an entrance and exit door in each bulkhead there are single sliding doors at both ends placed at one side of the center line of the car body as shown in the floor plan. The platforms are entirely vestibuled and have single sliding doors on both sides and at



PREPAYMENT CARS FOR MEXICO—The Single Sliding Platform Doors Are Under Control of the Conductor and Motorman

both ends in order to provide for double-end operation of the cars. The mechanism of these doors is so arranged that the doors are under control of the motorman or conductor. By establishing the practice of leaving at the front of the car it is expected that operation with the cars will be facilitated in the same manner as with Pay-As-You-Enter cars having the standard arrangement, a feature which has been one of their decided advantages. Aside from that, however, the cars effect the prepayment of fares and with the use of the Brill No. 2 far box with which each car is equipped it is anticipated that a marked increase in volume of fare receipts will be shown compared with the other cars in service.

One feature of the plan of the cars which is worthy of note is the seating arrangement. The location of the doors makes it possible to obtain maximum seating capacity, no seating room being sacrificed to

secure the Pay-As-You-Enter arrangement. The 14 transverse seats and two longitudinal seats will accommodate 32 passengers. The interior finish of the cars is cherry with birch veneer ceilings and rattan upholstered Brill Winner seats. The use of the Brill semi-convertible window system with its low window sills and both window sashes



PREPAYMENT CARS FOR MEXICO—The Interior Finish is Cherry and Brill Winner Seats Are Used—The Location of the End Doors is Due to the Use of the Prepayment Plan

raising into the roof pockets to give the full window opening, make the cars well adapted to the climate in which they will be used.

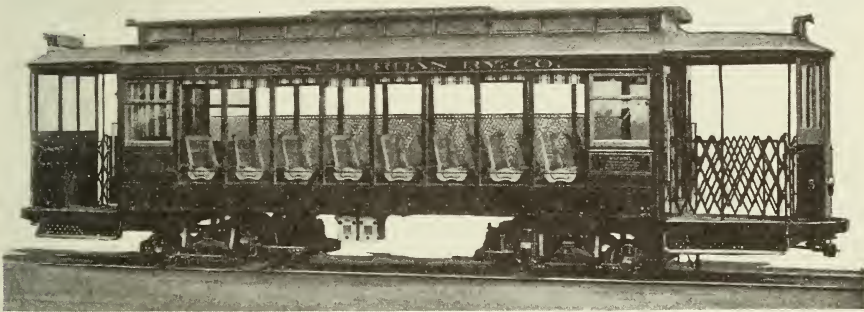
Each car as before stated is mounted on a Brill No. 21-E truck having a 7-ft. 6-in. wheel base and 33-in. rolled steel wheels. The principal dimensions of the car body are as follows:

Length of car body over end panels	20 ft. 8 in.
Length over platform crownpieces	32 ft. 1 in.
Length of each platform	5 ft. 8½ in.
Width of car at sill including panels	7 ft. 9½ in.
Width of car over posts above belt	8 ft. 2 in.

ONE-MAN PAY-AS-YOU-ENTER CARS

TWO-MOTOR OPEN CARS

IN BRILL MAGAZINE for December, 1909, a description was published of some single truck one-man Pay-As-You-Enter cars for Brunswick, Georgia. The City & Suburban Railway Company for which the cars were built has just added to its equipment two more one-man prepayment cars of a different type. As far as the arrangement for one-man operation is concerned the cars have the same construction and as the Pay-As-You-Enter arrangement is generally



ONE-MAN PAY-AS-YOU-ENTER CARS—The Brill No. 39-E Trucks On Which the Car is Mounted Each Carry a 30 h. p. Motor

familiar to all electric railway men and as it has been recently described in these pages, it will suffice to say that the front platform is used entirely for entrance and exit and the rear platform is closed on both sides with folding gates which are locked. The prepayment plan includes the use of a Brill portable fare box.

The two new cars are considerably longer than the single truck cars delivered some time ago and are mounted on Brill No. 39-E single motor trucks. They show the following principal dimensions and features:

Length of car body over end panels	26 ft. 1 in.
Length over crown pieces	39 ft. 3 in.
Length of each platform	6 ft. 7 in.

Width over sills, including plates	8 ft. 9 $\frac{1}{4}$ in.
Seating capacity	40 persons
Weight, including trucks and electrical equipment	28,700 lb.

For the present the cars will be operated as open cars, but they have been built with a center aisle and, as necessarily entrance and exit is at the end because of the use of the prepayment plan, the construc-



ONE-MAN PAY-AS-YOU-ENTER CARS—The Cars Are Built So That They Can Be Equipped With Removable Window Sash and Panels Between Posts

tion provides for removable sections between posts which will make the cars convertible into either open or closed cars at will. In this respect the cars will be like those recently built by The J. G. Brill Company for the Third Avenue Railroad, New York City, which were described in BRILL MAGAZINE for May, 1909.

The Brill No. 39-E trucks on which the cars are mounted have a 4-ft. 6-in. wheel base., 33-in. driving wheels and 21-in. pony wheels. Each truck carries a Westinghouse 30 hp. motor. The trucks are built for standard gauge track.

BRILL MAGAZINE

Published on the fifteenth
of each month by the

PUBLICITY DEPARTMENT OF THE J. G. BRILL COMPANY

In the interests of The J. G. Brill Company, American Car Company, John Stephenson Company, G. C. Kuhlman Car Company, Wason Manufacturing Company, Danville Car Company, Compagnie J. G. Brill.



LAST month in discussing some present problems in car construction reference was made to the question of the type of roof. Since that time we have endeavored to focus through our sales and engineering departments opinions regarding the comparative desirability of plain arch roof construction and the existing standard monitor roof. Our salesmen were asked whether they had encountered in their calls on electric railway officials any sentiment for or against the arch roof. Our engineers and car designers at the various plants were asked for an expression of opinion on the structural questions involved. Though answers favoring the arch roof were anticipated the preponderance of sentiment in behalf of the arch roof was quite surprising. The reports from the salesmen indicated quite conclusively that for two or three years past there has been a constantly growing tendency on the part of railway officials and engineers to seriously

consider the arch roof. This tendency has been largely developed by the discussion of light weight cars which has disclosed the fact that there is a saving in weight by the use of the arch roof. The saving in weight while amounting to not more than 200 or 300 lbs. under extreme conditions is yet enough, under the present frame of mind of electric railway engineers and managers, to secure the adoption of the arch roof—for we firmly believe that it is to be generally adopted in the near future. Nevertheless, there are other arguments for the arch roof, as the following summary will show.

1. The arch roof is lighter than a monitor roof and secures a saving in weight and hence a saving in operating expense.

2. A car with arch roof costs slightly less than one with monitor roof.

3. The arch roof construction is stronger than monitor roof construction.

4. Stronger construction and the elimination of many parts used in the monitor roof makes the maintenance expense of the arch roof a small item.



AS against these arguments for the arch roof the principal objections advanced are the appearance and the possibility of being unable to obtain satisfactory ventilation. Personally we look upon the argument of

appearance as one with practically no weight. An opinion of what is best looking changes like the styles and were all of the cars to-day to have arch roofs and the question of monitor roofs to be brought up a hue and cry would be raised about spoiling the appearance of the graceful arch. Any sentimental feeling for the appearance of the monitor roof may be explained on the basis of custom. The question of ventilation is a more serious one. With a growing demand from the public for clean, sanitary cars it is essential that ventilation be secured superior to that obtained by the present deck sash ventilators, because for some time past that system of ventilation has proven inadequate even when given proper attention by the platform men. As far as the application of improved systems of ventilation to cars with monitor roofs are concerned, those systems which involve forced circulation have unquestionably shown themselves to be most satisfactory and it is reasonable to expect that forced circulation is the coming thing in electric railway car ventilation. If such is the case even the objection to the arch roof car of inability to ventilate properly may be exploded, for certainly there is nothing in the arch roof construction which makes forced circulation ventilation impossible. Even without forced circulation the arch roof car is not unfeasible from the standpoint of ventilation, as some recent construction indicates.

IN connection with the argument of appearance of the arch roof one salesman brought up the question of the attitude of the public towards the feature, which aside from its weight as an argument for or against the arch roof was an interesting reflection of the feeling of the manager of nearly every electric railway that his every action with relation to the public must be carefully considered with respect to its probable effect as a creator of good will. Now manifestly it should make no difference to the travelling public whether a monitor deck or an arch roof were used on a car, provided comfort, convenience and other things which affect his welfare are equal. Yet it is entirely within a reasonable conception of contingencies to foresee the possibility of the citizens of some community finding in the change of design of equipment food for argument that the grasping traction monopoly was endeavoring to economize to the detriment of the equipment and the comfort of its passengers. This would be particularly likely to occur if the ventilation of the car with arch roof was not superior to the ventilation of the car with monitor roof which had previously been in service. The feminine patrons might be as ready to taboo the cars because of their appearance as they have in Philadelphia to complain of the Pay-Within car because the present styles in millinery make it uncomfortable for them to use the longitudinal seat instead

of the transverse seat formerly used. Yea, a public service corporation is now a public service corporation even unto the extent that it must cater to the aesthetic sensibilities of its patrons rather than the financial welfare of its own stockholders.



THERE are a number of economists of reputation who tell us that the increased cost of living, which is not entirely national but world-wide, is due to the overproduction and hence the depreciation in value of gold. These scholars back up their assertions with figures showing how rapidly the world's supply of gold is increasing and with facts regarding the cost of mining, smelting and other processes by which gold is reduced to a refined state, all of which tend to show that a gold dollar costs about 47 cents. They then produce figures from Bradstreet's and other authorities based on the average wholesale price of 96 commodities to show that in the past 13 years from July 1, 1896, to January 1, 1910 the cost of living has advanced more than 61 per cent.; that in the past 18 months it has advanced 19½ per cent.; in the past year 11.2 per cent. and in the past four months prior to January, 1910, 7.4 per cent. These two conditions they link together with the economic law which John Stuart Mill first enunciated

that "The value of money is inversely as general prices—falling as they rise and rising as they fall." Following the train of argument it is asserted that "prices will continue to rise; wages and salaries will rise only half as fast as prices; interest rates will average abnormally high; the cost of operating railroads and street railways will advance rapidly while rates and fares will advance slowly if at all."* The contention that the overproduction of gold is responsible for this condition can be proven quite convincingly, yet every electric railway manager is willing to concede what Mr. W. H. Glenn of the Georgia Railway and Electric Company has pointed out, that "in reality, the fare of to-day is only one-half of that collected twenty years ago, for in that length of time the price of almost everything entering into the cost of street railway transportation has increased 100 per cent. Lumber that was bought then for \$10 per 1000 feet is now \$28; steel rails that were bought then for \$24 per ton are now \$42, and a ton does not go half so far; copper, once at twelve cents per pound has lingered around twenty cents for the past few years, and has gone as high as twenty-six cents. In 1898 day laborers could be employed for seventy-five cents per day, while in 1907 they received \$1.50 per day and their work was not nearly so satisfactory. Twenty years ago such things as damage claims were almost unknown

*D. W. Holt "Too Much Gold" Everybody's, April, 1910

while to-day they appear in hordes, consuming from 5 to 15 per cent. of the gross revenue of the companies. In like manner all other costs have increased; yet all this time the fare of five cents has remained the same, while five times as good service has been given at an increased cost to-day of 100 per cent. over what the same service could have been furnished for twenty years ago." In addition to these facts regarding the increased cost of operation, the electric railway manager knows that because of a similar increase in the cost of the things entering into the living expenses of his employees, it has been necessary to increase wages. In all probability also he has found it necessary to increase the interest rate on the later issues of his bonds. Now, because all these conditions parallel so closely the things which the economists tell us are the result of the over-production of gold, let us accept their dictum of what must be expected in the future. The question then becomes one of how, continually rising prices, wages and interest rates are to be met. There are only two ways that they can be met—by increasing rates of fares or decreasing operating expenses. As

far as increased rates of fare are concerned, the economists tell us that "rates and fares will advance slowly, if at all." Accordingly decreasing operating expenses is the only solution. And with prices of materials constantly advancing only the most capable and most highly trained men will be able to secure the necessary decrease through efficiency in every department.



WE will gladly describe and illustrate any feature of car or truck construction in which the readers of BRILL MAGAZINE may be interested and shall be glad to receive inquiries and suggestions for articles on pertinent subjects. The columns of BRILL MAGAZINE are at all times open to communications dealing with the operation or construction of cars and trucks. Detailed specifications of the cars described in BRILL MAGAZINE or additional information can be obtained by addressing Publicity Department, The J. G. Brill Company, Philadelphia.



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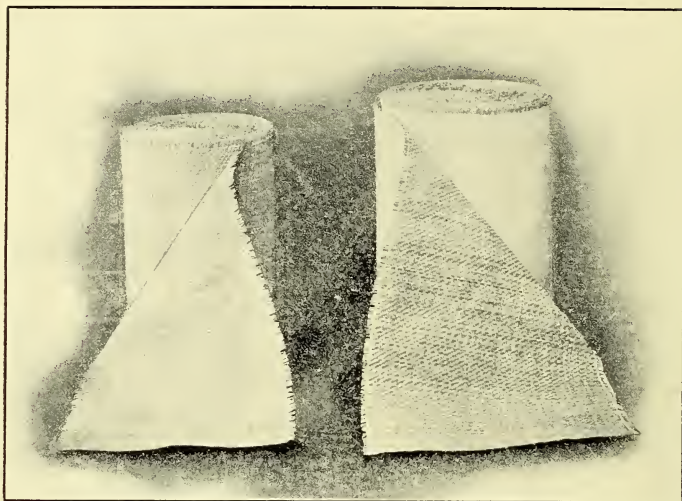
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Shanghai



LONG WEARING CANE SEATING

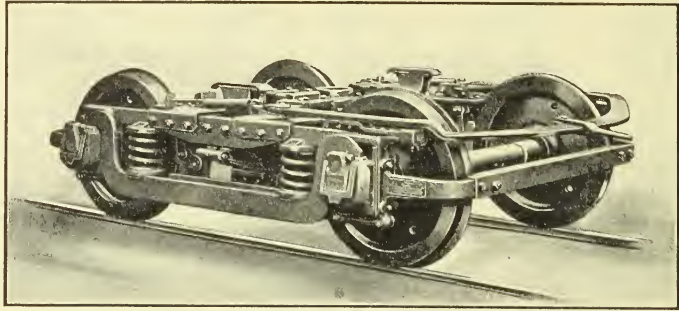
You can't buy cane seating material of Brill quality from any other maker. The cane from which Brill seating is made comes from Sumatra and Borneo and is a selected portion of the product of certain highlands where the growth is slow. The climate, altitude and soil in that particular locality give a specially tough fibred cane with a hard silicate surface which makes Brill cane seating material the longest wearing on the market.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE



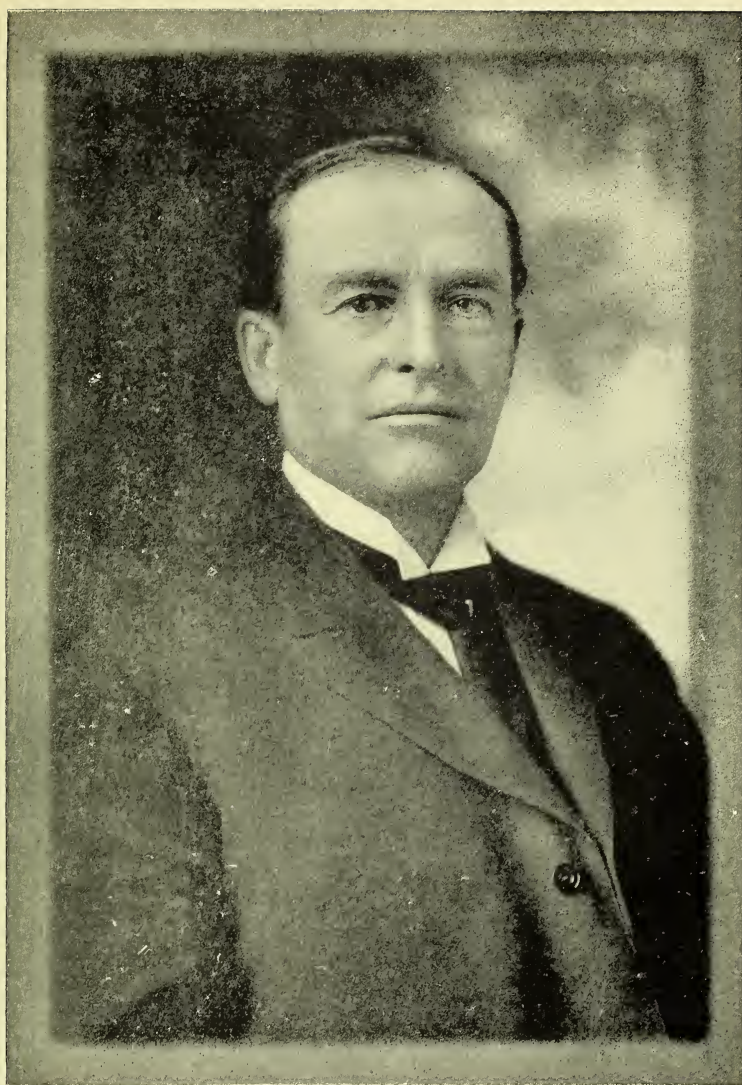
Monument Square
Cleveland, Ohio



No. 27-M. C. B. HIGH SPEED TRUCK

In high speed service a truck receives shocks strains and vibrations which are acknowledged to be severe but whose magnitude it is impossible to determine because of their nature. For that reason every Brill No. 27-M. C. B. truck is designed and built with a safety factor of six. As an additional safeguard there is the solid forged side frame construction which eliminates those weaknesses and dangers which are inherent in castings and built-up work. Solid forged means safety and long life. Compare the frame of the Brill No. 27-M. C. B. with the frame of any other high speed truck for rivets in shear and see what the one-piece forging secures.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



J M Roach



BRILL MAGAZINE

Vol. IV

SEPTEMBER, 1910

No. 9

JOHN M. ROACH

[WITH PORTRAIT INSERT]

JOHAN M. ROACH, president of the Chicago Railways Company and managing receiver of the Consolidated Traction Company of Chicago, was born in 1852 in Jackson County, Ohio, of Scotch-Irish stock which originally settled in Virginia. He came to DeKalb, Illinois, with his parents at the age of ten years. Five years later he returned to Ohio, to enter college at Beverly, where he spent two years, after which he went to Helena, Montana, where he did newspaper work for a while and also became interested in mining propositions. From Helena he went on horseback to Walla Walla, Washington; Portland, Oregon, and down the Pacific Coast to Los Angeles, from which point he turned east and rode to Salt Lake City. Still unsatisfied with the outlook he went to Chicago where some friends advised him to enter the street railroad business. Accepting the suggestion, Mr. Roach entered the employ of the old North Chicago Street Railroad as a conductor in 1872. He served in that capacity for six months and perhaps it was because he turned in more fares than any other conductor that the officials made him cashier. In 1879 he had been promoted to the position of purchasing agent; in 1890 he was superintendent of the road, and three years later had attained the position of second vice president and general manager of the company. In 1897 he was elected vice president and general manager of the West Chicago Street Railroad Company. Two years later Mr. Roach was chosen vice president of the Union Traction Company and when that corporation under the new order of things became the Chicago Railways Company in 1908, Mr. Roach was elected president and general manager. Under his charge are over 500 miles of the busiest surface car lines in this country which daily carry more than 1,200,000 passengers and operate under a partnership agreement with the city of Chicago.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

CLEVELAND, OHIO*

TRACTION affairs in Cleveland have been in such a chaotic state for the past two years that, while new rolling stock has been added to the equipment of the traction company, it has been impossible to distinguish whether the influences affecting the design were due to normal conditions or were the result of the complex circumstances arising from the so-called attempt at municipal operation. With the present more stable conditions, it is now possible to consider both the cause and effect of the principal features of the cars in question.

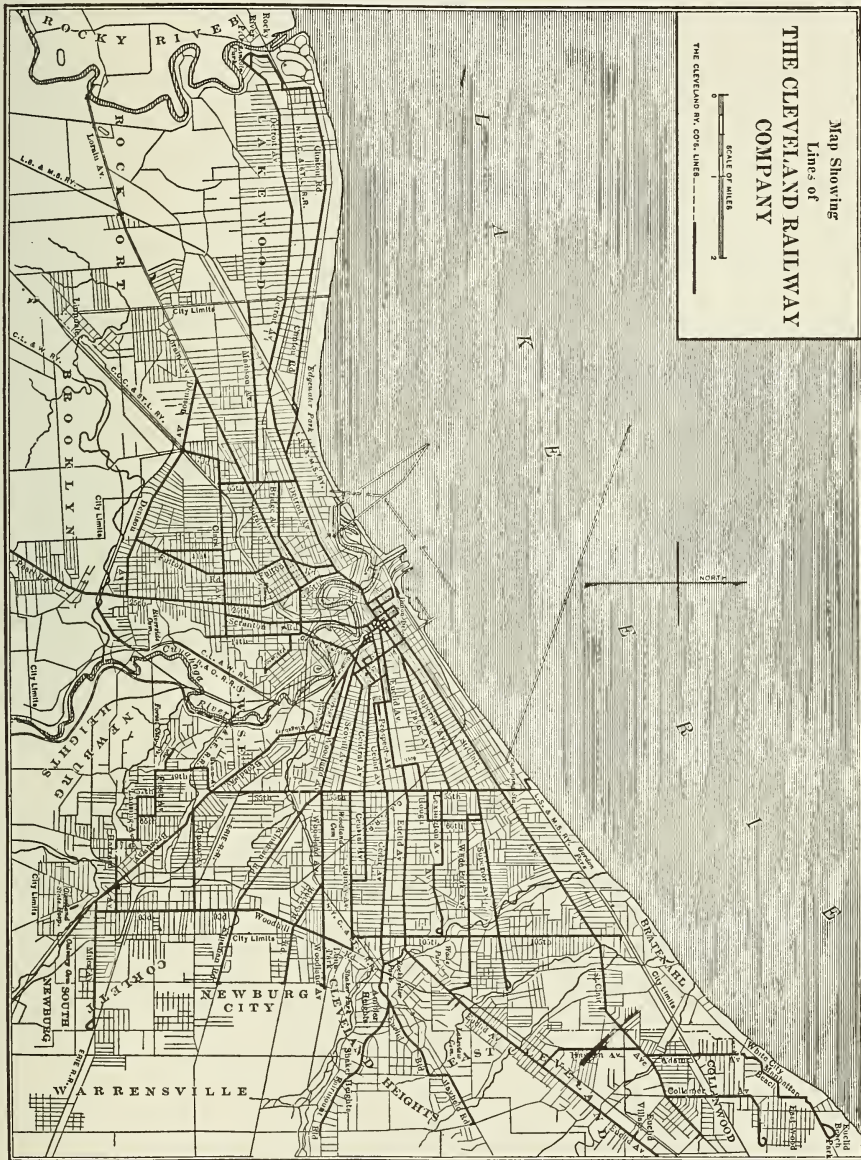
The new cars, of which 25 were built and delivered by the G. C. Kuhlman Car Company, early this year, have attracted much attention in this country and abroad because of their exceptional length, the figures for the principal dimensions being as follows:—

Length of car body over corner posts	36 ft. 0 in.
Length of front vestibule	7 ft. 2½ in.
Length of rear vestibule	7 ft. 11½ in.
Length of car over buffers	52 ft. 0 in.
Width over sills	8 ft. 1 in.
Width over posts	8 ft. 2 in.
Height bottom of sill over roof	8 ft. 6 in.
Bolster centers	24 ft. 0 in.
Minimum radius track curve	30 ft. 0 in.

The details of truck and electrical equipment and the figures for the weight of the cars are as follows:—

Trucks	Brill No. 27-G1
Motors	4 West 40 h. p.
Weight	
Car body	24,340 lb.
Motors	12,500 lb.
Trucks	11,260 lb.
Total	48,100 lb.

* This is the twenty-first in a series of articles, each of which discusses the tramway system of some important city of the world with particular reference to the type of car which is used.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Cleveland Has A Population of 560,663 and 245 Miles of Electric Railway Track—It is Also Served by Several Interurban Electric Railways—Map Reproduced from American Street Railway Investments By Courtesy McGraw Publishing Company

The cars are generally considered the largest thus far built for strictly city service and all available records seem to bear out this contention. A study of the operation of the Municipal Traction Company discloses the reason for their exceptional size, for it must be borne in mind that the cars were ordered before the Cleveland traction properties were returned to the Cleveland Railway Company.

Control of the Cleveland Electric Railway Company was secured by the Municipal Traction Company under a lease dated April 27, 1908. During the six and a half months from that time to November 12, 1908, when receivers were appointed, although the reputed municipal management had various plans and made various efforts for



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—This Cleveland Car of Which Twenty-five Are In Operation Is Said to be the Longest City Car in Regular Service
Length 52 ft. Over Bumpers—Mounted on Brill No. 27 G Trucks

the development and betterment of the property, its principal efforts were in the direction of cheapening the cost of operation. That this was imperatively necessary appears to have been due to a number of circumstances, but primarily to the fact that the terms of the lease provided that the Municipal Traction Company should pay to the Cleveland Electric Railway Company 6 per cent. annually, in quarterly installments of $1\frac{1}{4}$ per cent., upon \$14,675,600. of capital stock of the Railway Company as well as all legal debts except the outstanding bond issues and floating debt and accident and certain other liabilities. Failure to pay the annual rental each quarter involved forfeiture of the lease after two payments had been passed and installments in arrears bore interest at the rate of 8 per cent. These requirements coupled with an effort to give 3-cent fares with universal transfers, a campaign

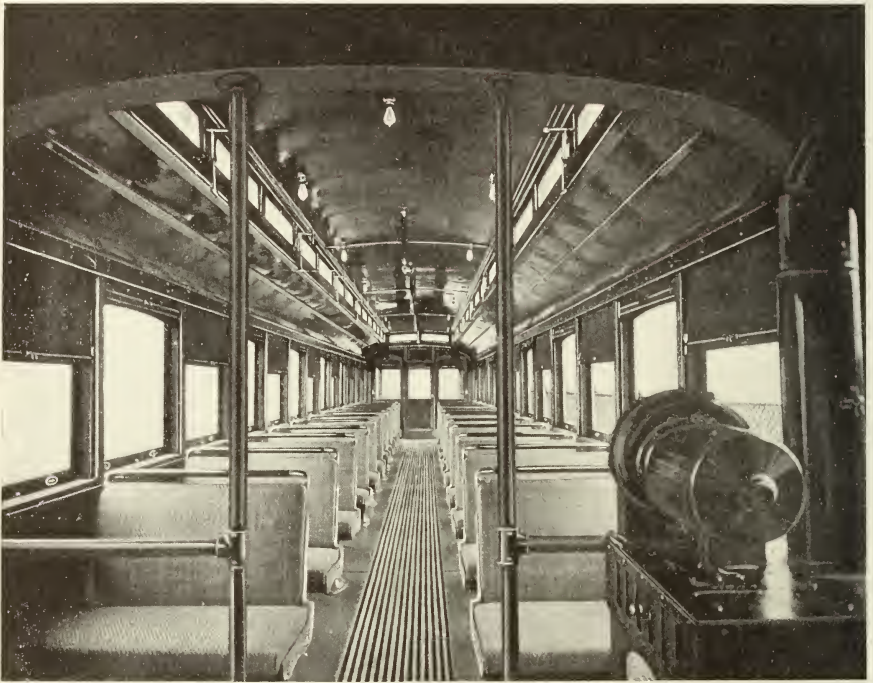
understanding which was not complied with, and management in some respects diametrically opposed to American standard practice, which was either the result of inexperience or poor organization and which caused a decrease in the number of passengers carried as well as a decrease in receipts, necessitated radical efforts towards economy.

It is not possible to take up in detail the various means used to cheapen the cost of operation, but it is quite apparent that the large cars were in many ways the result of an effort to reduce car mileage. The Municipal Traction Company adopted a plan of operating fewer cars at all hours of the day and of running them at higher speed. Fewer cars meant a smaller charge for wages and the lessened car mileage meant a lessened charge for maintenance, the terms of the lease providing a maintenance charge based on car mileage. The fewer number of cars operated resulted in many complaints both regarding the infrequency of the service and the crowded condition of the cars. The management of the Municipal Traction Company, of which A. B. duPont was president, was not insensible to these criticisms. Doubtless Mr. duPont believed that the difficulty could be relieved by larger cars and as the specifications for the cars described above were drawn while he was advisor and consulting engineer for the receiver of the Municipal Traction Company, it is reasonable to suppose that the experience of the Municipal Traction Company at least had some influence in the decision to make the cars as large as possible.

Observation of the operation of the large Cleveland cars at present discloses the fact that except during rush hours there is little crowding. This condition may be partially accounted for by the fact that the Cleveland Railway Company has restored a large number of cars which were removed from service by the Municipal Traction Company, as well as by the fact that the size of the cars relieves crowding. However, it is interesting to note that when the travel is very heavy as during the rush hours, a time when heavily loaded cars are to be expected, it is practically impossible to load the cars to capacity.

With the Pay-Enter system, as it is called in Cleveland, it is impossible for the conductor to force passengers standing in the aisle to move up towards the front of the car in spite of an effort to establish a "leave by the front" practice. This difficulty, which is a weakness of the size of the cars rather than of the prepayment system, results in

a condition which makes it impossible at times for passengers to board the car at the rear, as they necessarily must, even though there is a large amount of standing room in the front of the car. The Cleveland Railway Company is now employing efficient inspectors and at certain times it is not unusual to see these men making vigorous efforts to load the cars to capacity by climbing partially through the windows and per-



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Forced Circulation Heater in the Foreground is Located on the Front Platform and in Summer is Removed to Increase the Seating Capacity—There Are Five Platform Seats

sonally requesting passengers in the center of the car to move up towards the front in order to allow others to board the car.

This is only one feature of the Cleveland cars. Lack of space prohibits the consideration of others, such as the prepayment system; the forced circulation ventilation system, which has successfully heated and ventilated the large Cleveland cars in winter; the long platforms; the unusual seating arrangement.

PLANTATION EQUIPMENT FOR PERU

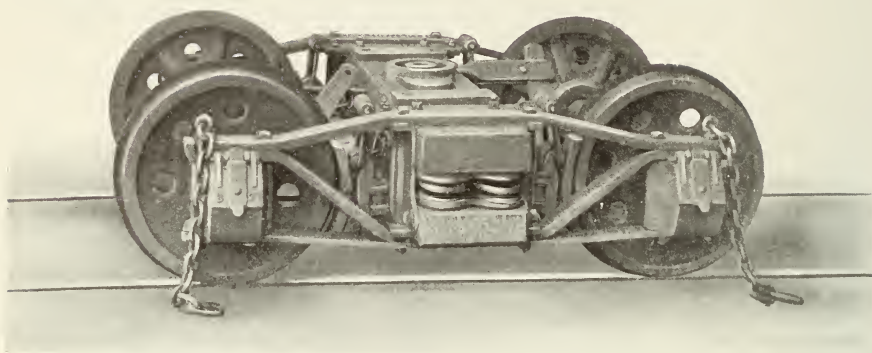
CANE CARS

FIFTY sugar cane cars were shipped from the plant of The J. G. Brill Company during August and will be placed in service in Peru in time for use this season. The cars, which are virtually platform cars for narrow gauge track, have five bulkheads 4 ft. 6 in. high extending across the car and dividing each car into four compartments. The bulkheads are spaced 5 ft. 6 in.



PLANTATION EQUIPMENT FOR PERU—Each Car is 26 ft. 1 in. Long Over End Sills—The Bulkheads are Plated With Steel to Facilitate Unloading of the Sugar Cane

apart and are 5 in. thick. They are of solid construction and are plated with $\frac{3}{16}$ -in. steel on each side, with the exception of the end compartment walls which are plated on the inside only. Each car is 26 ft. 1 in. long over end sills and 6 ft. 6 in. wide over side sills. The carrying capacity is 14 tons. At one end of each car there is a short platform on which is a brake shaft with horizontal iron brake wheel. Both ends of the car have cast iron buffers, a draw bar hook and coupling link. The height from top of rail to center of coupler is 23 in. The cars are mounted on Brill trucks No. 55-D which are the diamond frame arch bar type with wood bolster and spring plank and spiral bolster springs arranged in nests of four at each end of the bolster. These trucks have a 4-ft. wheel base, 22-in. cast chilled iron



PLANTATION EQUIPMENT FOR PERU—Brill Truck No. 55-D Used Under the Cars—The Wheel Base is 48 in. and the Track Gauge 36 in.

wheels with 3-in. tread and 1-in. flange and journals 3 by 6 in. in size. The trucks are designed for use on 36-in. gauge track which has curves with minimum radius of 80 ft.



CAFE-CHAIR CAR SERVICE OF THE CHICAGO & MILWAUKEE ELECTRIC RAILROAD NEW CAR EQUIPMENT

IN addition to the cars for the Chicago & Milwaukee Electric Railroad which were described in the July number of Brill Magazine, the American Car Company built a cafe-chair car which is shown in accompanying engravings. The addition of this car gives the railroad four of the type which are operated in connection with eight daily three-car limited trains each of which carries one of the cafe-chair cars. The fare from Milwaukee to Evanston, a suburb of Chicago, where connection is made with the Northwestern Elevated Railroad running into the heart of the city, is \$1.35 which

includes twenty-five cents excess fare for the limited service and covers the cafe car privilege, charge being made only for the food which is served. The regular fare on the Chicago & Northwestern Railway, the paralleling steam line, from Milwaukee to Evanston is \$1.46. The distance is 73 miles.

As an indication of the success of the limited train service, Mr. E. E. Downs, general manager for the receivers of the property, advises



CAFE-CHAIR CAR SERVICE OF THE CHICAGO & MILWAUKEE ELECTRIC RAILROAD—One of the Cars in Front of a Station Typical of Those at the More Important Points Along the Line

that during the month of July, 30,964 revenue passengers were carried on the trains in question, or an average of 125 revenue passengers per train per day. The cafe service is not operated at a profit but has practically carried itself. The accompanying menu card shows the wide variety of dishes which may be had and the reasonable prices. A fairly extensive stock of bottled wines and liquors is also carried which are to be had at proportionate prices.

A plan of one of the cars is presented herewith. The chairs are of green wicker design with leather cushions and leather padded backs and arms. The maximum seating capacity of these upholstered chairs is 29 with no tables set up. When tables are set up it is desirable to move two or three chairs to the vestibule or off the car entirely. When an extra large load is carried the wicker

A LA CARTE

As each order is specially prepared, guests will be served more promptly if orders are given to waiters as far in advance as possible.

SOUPS

Tomato 20c Vegetable 20c Chicken 20c Clam Chowder 25c
Clam Broth 20c

RELISHES

Olives 15c Pickles (Sweet) 15c Sliced Tomatoes 25c
Head Lettuce, French Dressing 25c

ENTREES

Chicken Tamale 40c Braised Beef a la Jardiniere 50c Chili Con Carne 30c
Chicken Saute 50c
Corned Beef Hash 40c Vienna Sausage 30c

GRILLED

Sirloin Steak 75c Lamb Chops (2) 50c Tenderloin Steak 65c
Broiled Young Chicken, Half 65c
Armour's Star Ham or Bacon 50c; with two fried eggs 60c

COLD DISHES

Ham or Ox Tongue 45c Baked Beans, hot or cold 25c
Columbia River Salmon 35c Imported Sardines 35c
Fried Egg, Ham, Tongue or Cheese Sandwich 15c

VEGETABLES

Stewed Tomatoes 15c Stewed Corn 15c June Peas 15c
Potatoes, German Fried 10c Hashed Brown 15c

EGGS

Fried or Scrambled 20c

OMELETTES

Plain 30c, With Chopped Ham or Parsley 40c
Scrambled Eggs, With Minced Ham on Toast 50c

BREADS

Parker House Rolls 10c Vienna 10c Graham 10c
Bread and Milk 20c Home Made Pie 10c Maple Flakes 20c

PRESERVED FRUITS IN GLASS

Figs, Strawberries, Cherries, Raspberries, Plums 25c
Berries in Season 25c Cantaloupe on Ice 25c

CHEESE

Canadian or American Cheese With Crackers 20c

TEA, COFFEE, ETC.

Cocoa 15c Tea or Coffee, Per Cup 10c Pot of Coffee 15c
Horlick's Malted Milk 15c Milk 10c Ice Tea or Coffee 15c

Bread and butter served with individual meal checks amounting to 40 cents and over.
No order less than 25 cents to each person.

side and a row of chairs down the other is merely to illustrate table and chair capacity of car. Ordinarily five tables are set up, one in the smoking compartment and four in the main compartment, the two pair farthest away from the observation end.

The motorman's cab is of such design that it may be folded in to a very compact shape and the vestibule used as an observation end for seated passengers.

The kit-

chen equipment includes a range consisting of broiler, coffee urn, cooker and hot-water tanks. Surmounting these is a sheet-steel hot-dish closet. The broiler portion is equipped with two alcohol burners, which are located under corrugated iron broiler plates $8\frac{3}{4}$ in. x $12\frac{1}{2}$ in. in size each. The daily consumption of alcohol fuel is 1 gal. to $1\frac{1}{2}$ gal. per day. It is possible for this broiler to broil a chop satisfactorily in about six minutes. On the side of the range opposite the broiler is a cooker tank for cooking and warming soups, etc., and in the back is a tank which holds clean hot water used for such purposes as making tea, etc. In the front on the extreme right is a $1\frac{1}{2}$ -gal. coffee urn. Under the broiler plates is a tin box or can to collect the grease from broiled meats.

A detailed list of china, glassware, silver, linen and other equipment for one car follows:

LINEN

36 table cloths, 36 in. x 45 in.
72 table tops, 23 in. x 35 in.
168 napkins, 20 in. x 20 in.
36 dish towels.
36 glass towels.

12 waiter's aprons.
6 cook's aprons.
12 waiter's jackets.
6 cook's jackets.
2 blue jackets.

2 blue aprons.
12 table felts.
2 small meat cloths, 18 in. x 36 in.
2 wrappers, 56 in. x 72 in.

KITCHEN UTENSILS

3 egg fry pans.
1 fry pan.
2 small egg whips.
2 vegetable ladles.
3 aluminum saucepans.
1 aluminum saucepan.
2 meat platters.
1 improved rice boiler.

1 4-qt. improved coffee pot.
2 dredge boxes.
2 12-in. basting spoons.
4 14-in. basting spoons.
2 potato knives.
1 cook's fork.
1 bread board.
2 scrub brushes.

1 8-qt. galvanized pail.
1 broiler scraper.
1 weight, 2 in. x 4 in.
1 weight, 2 in. x 5 in.
3 1-qt. crock.
1 2-qt. crock.
1 pudding pan.

CHINA

30 8-in. plates.
18 butter chips.
6 soup plates.
6 small platters.
15 large platters.
24 coffee cups.

24 coffee saucers.
8 small vegetable bakers.
3 sauce dishes.
2 mustard pots.
3 celery trays.
6 after-dinner cups.

6 after-dinner saucers.
4 holder egg cups.
3 cocoa pots.
4 fancy finger bowl plates.
6 bean pots

GLASSWARE

18 water glasses.
12 beer glasses.
6 whiskey glasses.
6 claret glasses.

6 straight champagne.
2 vinegar bottles.
2 water bottles.
5 salt shakers.

6 pepper shakers.
6 ale glasses.
2 toothpick holders, 594A.

SILVERWARE

18 knives.
18 medium forks.
36 tea spoons.
12 dessert spoons.
6 after-dinner coffee spoons.

6 oyster forks
4 white-handled knives.
2 silver tongs.
1 ginger ale holder.

2 loaf sugar bowls.
2 powdered sugar bowls.
1 cash tray.
2 silver hinged-cover creamers.

MISCELLANEOUS

4 brass finger bowls.
2 2-cup tea pots.
4 independent tea pots.
2 nickel coffee pots.
2 aluminum trays.
1 knife board.
1 cork puller.
1 bar strainer.
2 bar towel hangers.

1 bar spoon.
2 rubber stoppers.
4 tea strainers.
1 ice pick.
1 ice shaver.
1 can opener.
2 mustard spoons.
1 ham knife.
1 bread knife.

1 steel.
1 ice scoop.
1 silver brush.
1 paste brush.
1 keeler.
1 2-qt. cream can.
1 1-qt. cream can.
1 small cleaver.

CARS FOR THE LEHIGH VALLEY TRANSIT COMPANY

CONVERTIBLE TYPE

A NUMBER of roads have added to their equipment cars of the convertible type adopted as standard by the Third Avenue Railroad of New York City. Among these is the Lehigh Valley Transit Company to whom The J. G. Brill Company recently delivered ten Pay-As-You-Enter cars of the type shown in the accompanying engravings. The following is a table of the principal dimensions:

Length of car body over corner posts	30 ft. 1 in.
Length of each platform	5 ft. 10 in.
Length of car over vestibules	41 ft. 9 in.
Length of car over bumpers	43 ft. 1 in.
Length of car at sills including plates	8 ft. 8 in.
Width of car over posts	8 ft. 8 in.
Weight, car and trucks with air brakes and electrical equipment and including removable panels	49,420 lb.

The feature of the cars is the removable panels reaching from the top of the sill plate to the letter board. There are nine of these panels on each side of the car and two fixed panels at the corners of the car which are made of steel and are fitted with plate glass windows. The removable panels also have plate glass windows, which, unlike some of



CARS FOR THE LEHIGH VALLEY TRANSIT COMPANY—One of the Cars With Panels Removed and Screens in Place—The trucks Are Brill No. 27-M, C. B., for High Speed Service

the previous convertible cars of the type, can not be opened. When the panels are removed in order to place the cars in summer service, sectional screens are placed between posts and these extend from the top of the sill plate to a height 44 in. from the floor. As a part of the removable panel construction the side sills, which are long leaf yellow pine 4-½ by 7 in., are plated with 14 in. by $\frac{9}{16}$ -in. steel plate. The plate extends above the level of the floor.



CARS FOR THE LEHIGH VALLEY TRANSIT COMPANY—Interior View Showing the Removable Screens in Position Between Posts

Each car is the double end type and has the standard Pay-As-You-Enter arrangement with full vestibules, four section folding doors being provided on the controller side of the car and a single sliding door on the brake shaft or exit side. The folding doors are arranged so that when they are closed a pipe pivoted on the doors extends across them and latches to the corner post. When the doors are open the pipe is held in a vertical position behind the door. The sliding exit

door slides into a pocket which has a hinged window on the inside for easy access to the door mechanism and for cleaning the outside window. The two doors in the end bulkhead both slide towards the center of the car.

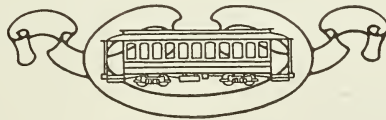
The interior finish of the cars is selected cherry with composition ceiling. There are nine Brill Winner reversible seats on each side of



CARS FOR THE LEHIGH VALLEY TRANSIT COMPANY—The Windows Are Plate Glass and Can Not Be Raised or Lowered

the car and longitudinal seats at the four corners of the car, giving a seating capacity of 44 persons. The seats are upholstered in rattan. The cars have pantasote curtains and push buttons on each post.

Brill No. 27-M. C. B. 1 trucks for high speed service carry the cars. The trucks have a 6-ft. wheel base, 34-in. rolled steel wheels with 3-in. tread and $\frac{3}{4}$ -in. flange and axles 5 in. in diameter. The journals are $4\frac{3}{4}$ by 8 in.



EQUIPMENT FOR GUADALAJARA,
MEXICO

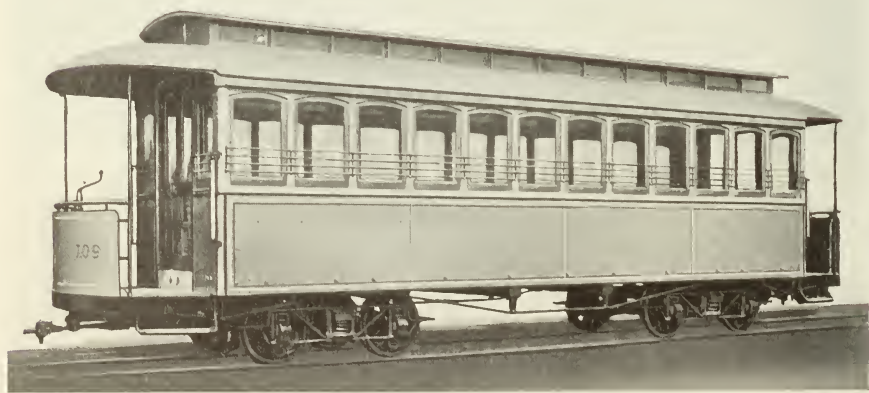
SECOND-CLASS TRAIL CARS

THE Danville Car Company was the builder of ten cars of the type shown in the accompanying engravings for the Compania Hidroelectrica E Irrigadora del Chapala. The cars have the following dimensions:—

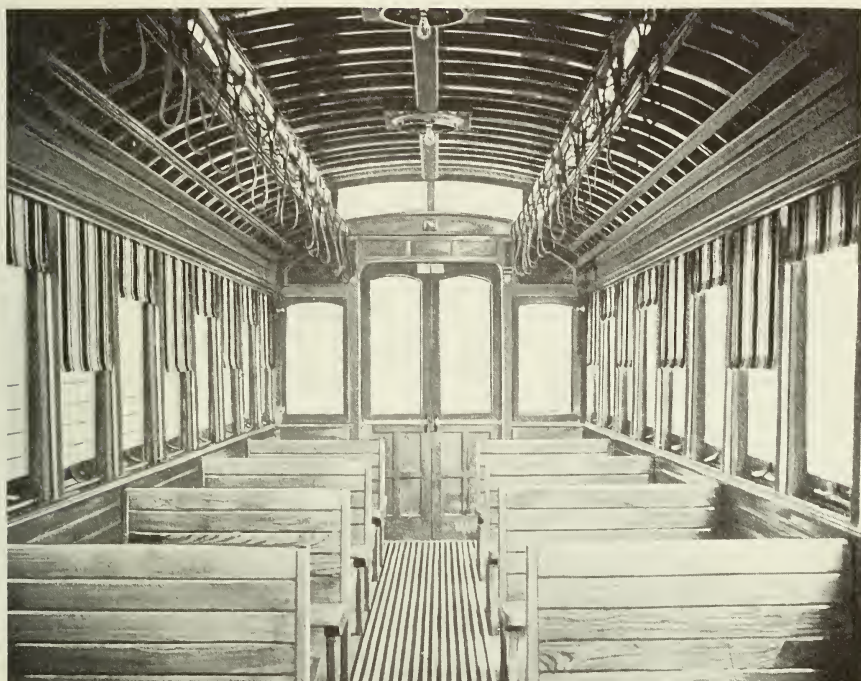
Length over bumpers	35 ft. 0 in.
Length over panels	27 ft. 4 in.
Length of platform over bumpers	3 ft. 10 in.
Width over posts	8 ft. 0 in.
Height underside of sill to top of roof	9 ft. 3 in.

As the cars are for second-class service the interior finish is ash of plain design and the ceilings have the carlines showing. The side ceilings have moldings for advertising cards and striped duck curtains are used at the side windows, which are the drop sash type. There are five double seats of ash slat construction, back to back, on each side of the aisle and a stationary seat in each corner, giving in all a seating capacity of 44.

Except for the interior finish the construction of the car is first-



EQUIPMENT FOR GUADALAJARA, MEXICO—The Cars Have Straight Sides With Steel Sheathing and Drop Sash—The Trucks Are Brill No. 57 for Trail Service



EQUIPMENT FOR GUADALAJARA, MEXICO—The Interior Finish With Ash Slat Seats and Striped Duck Curtains Indicates the Second Class Service in Which the Cars Will Be Used

class. The underframing includes yellow pine side- and sub-sills and oak cross sills, all securely tied with $\frac{3}{4}$ -in. rods. The posts are ash and each has both under and upper truss rods. The platform framing is oak including the crownpieces and bumpers. The straight sides of the cars are sheathed on the outside with sheet steel.

The cars are mounted on Brill No. 57 trail trucks which are built for standard gauge track and have 28-in. cast chilled wheels with 2- $\frac{3}{4}$ -in. tread and $\frac{3}{4}$ -in. flange. They will be operated over track of which the sharpest curve has a radius of 35 ft. The No. 57 Brill truck is one which is extensively used in the United States and abroad for trail service and is frequently referred to as Brill truck No. 420 under which number it was originally known.

CARS FOR THE HOUSTON ELECTRIC COMPANY

PLAIN ARCH ROOF EQUIPMENT

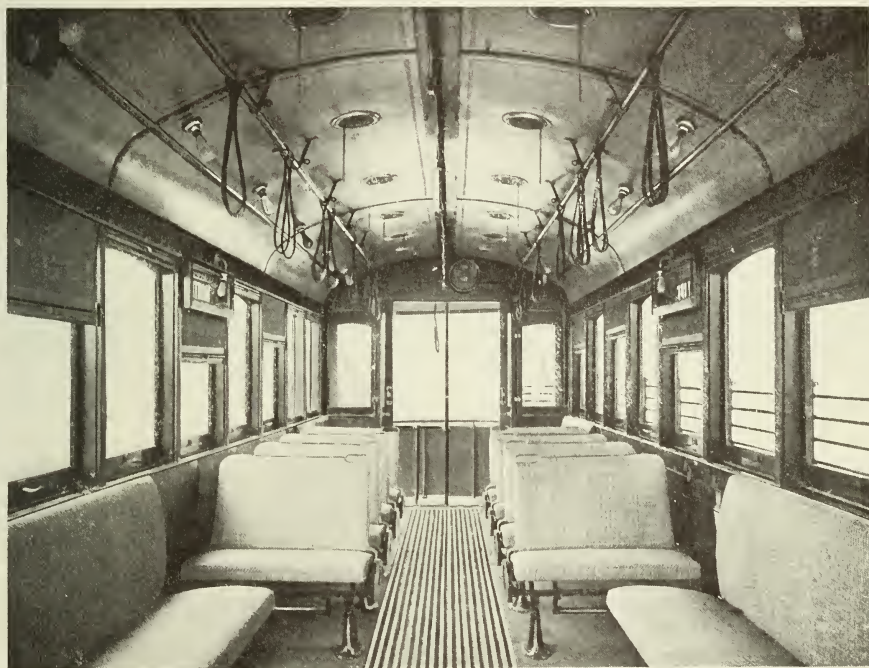
EDITORIAL comment on the merits of the plain arch roof was made in the August number of Brill Magazine and the accompanying engravings show one of the cars on the first order of appreciable size for cars with this construction. Fifteen cars went forward to the Houston Electric Company from the plant of the American Car Company at St. Louis in a single shipment.



CARS FOR THE HOUSTON ELECTRIC COMPANY—The Graceful Arch of the Roof Gives a Pleasing Appearance—The No. 39-E Single Motor Trucks Have a 4 ft. 6 in. Wheel Base

One of the principal objections to the arch roof car has been the appearance, and accordingly photographs of the Houston cars are particularly interesting. It is not believed that either the exterior or interior is of objectionable appearance and doubtless there will be many who will consider the interior more attractive than that of a car with a monitor roof. The question of ventilation is taken care of by sixteen 6-in. ventilators of patented type which can be opened and closed. While the roof is the plain arch type, both platform hoods are detachable. The front platform is of the closed type and supports the platform hood. The rear platform hood is supported by two pipe

stanchions and the hood is fastened to the car body with lag screws and angle irons. Both hoods are of a construction generally similar to that of the roof which has $3\frac{1}{4}$ by $1\frac{1}{2}$ -in. oak carlines shaped to the outline of the roof and strengthened on each pair of posts with $\frac{5}{16}$ by $1\frac{1}{4}$ -in. steel carlines with feet resting on the top of the posts. The roof is covered with $\frac{3}{8}$ by 3-in. yellow poplar and the ceiling is $\frac{1}{4}$ in. composition board placed in sections and molded off with mahogany.



CARS FOR THE HOUSTON ELECTRIC COMPANY—There Are Sixteen Ventilators Which Can Be Closed or Opened—The Interior Finish is Mahogany

The cars are the single-end type and have a full-vestibuled front platform and an open rear platform which is arranged for prepayment operation. The front platform has a single sliding exit door with mutually operating folding step.

The underframing comprises $4\frac{1}{2}$ by $7\frac{3}{4}$ -in. yellow pine side sills reinforced at the bolsters with 6 by $3\frac{1}{2}$ by $\frac{3}{8}$ -in. angle iron 4 ft. long. The cross sills are oak $2\frac{3}{4}$ by 5 in. reinforced with 4 by $\frac{3}{16}$ -in. steel

plate with a 4-in. foot on each end. On the opposite side from the plate there is a $\frac{3}{16}$ by 4 by 6-in. angle iron. There is a $\frac{5}{8}$ -in. tie rod at each cross and end sill. The end sills are made of 4 by $7\frac{3}{4}$ -in. oak reinforced on the inner side with 6 by $\frac{3}{8}$ -in. steel plate with a 12-in. foot on each end. The outside platform knees are made of 6-in. Z-bars. There are 1-in. truss rod under each side sill and inside truss rods made of $\frac{3}{8}$ by $2\frac{1}{2}$ -in. steel.

There are single sash in the window openings which are 34-in. high. The sash are arranged to drop. Three-bar window guards are placed



CARS FOR THE HOUSTON ELECTRIC COMPANY—The Entire Shipment of Fifteen Cars Leaving the Works of the American Car Company at St. Louis

on each side of the car and in accordance with a quite general practice the guards are hung on malleable brackets and arranged to drop in sections so that the windows may be easily cleaned. The interior finish is solid mahogany, the seats are upholstered in rattan, pantasote curtains are provided at the windows and there are push-buttons on each post. Each car, which has a seating capacity for 24 persons, has the following principal dimensions:

Length of car body over corner posts	26 ft. 0 in.
Length of front platform over dashers	5 ft. 0 in.
Length of back platform over dashers	6 ft. 6 in.
Length of car over platform	37 ft. 6 in.
Width over sheathing below windows	8 ft. 5 in.
Height from top of floor to under side of headlining	8 ft. 0 in.

The cars are mounted on Brill No. 39-E single-motor trucks.

BRILL MAGAZINE

Published on the fifteenth
of each month by the

PUBLICITY DEPARTMENT OF THE J. G. BRILL COMPANY

In the interests of The J. G. Brill Company, American Car Company, John Stephenson Company, G. C. Kuhlman Car Company, Wason Manufacturing Company, Danville Car Company, Compagnie J. G. Brill.



THE annual convention of the American Street and Interurban Railway Association and its affiliated organizations will be held at Atlantic City, N. J., from October 10 to 14 inclusive. Already the most comprehensive exhibit of electric railway apparatus ever assembled under one roof is assured and the convention will in all probability be more largely attended than any previous convention. The work of the Association is such that no electric railway can afford not to be represented. To be sure most of the papers which will be read will be printed in the technical press and the principal discussion will also be reported. But by no other means than personal presence can all possible good of the meetings be obtained. No other occasion presents such an opportunity for the study of modern developments in equipment, of devices and methods to increase earning power and solve various prob-

lems, nor such an opportunity to visit with electric railway men from other parts of the country and find out what they are doing under the same circumstances as yours. The electric railway official who stays at home will make a mistake.



AFTER an electric railway has gone through the precarious period following projection and has attained the condition of a new operating electric railway, it, like a human being, is beset with all of the dangers of infant mortality. Some of these dangers are due to unwise or too expensive construction which make it impossible to pay fixed charges and operating expenses. Other dangers arise from the personnel of the management. As was pointed out in a previous editorial in these columns, most electric railways are built for the most part by home money and in many instances the principal officers of the company are prominent business men of the vicinity whose money is to be found in the leading industries. Perhaps one of these men of unquestioned general business ability undertakes the management of the new road, or more probably one of them has a son who attended a neighboring college and studied electric engineering, or there is some promising young man of local raising who has shown more or less talent in the same

direction, to whom the management is given under the advisory supervision of the older men whose money built the road. John Smith, a local product of general mechanical ability, is made master mechanic. The owners of the road have a commendable desire to help their own townspeople and much pride in their ability to themselves swing the whole proposition, including financing, construction and operation. When the end of the year comes and the annual statement is made out there are some surprises. The figures for the number of passengers carried probably don't size up as large as they did in the prospectus and there are some unforeseen expenses in the mechanical and electrical department. Possibly some new motors had to be bought or one of the cars was badly smashed up when the brakes failed to work and the car ran away down hill or smashed into another car. But the things that caused all the trouble are accounted for, a few things are decided on and otherwise things are continued as before. Perhaps the active managers do learn enough by experience to pull things through, but it is quite as apt to be the case that things run along for another year or so showing some improvement, but not enough, and then either the bankers step in and force a reorganization with some experienced practical electric railway men in charge or there is a receivership. Probably most new roads take the latter cure sooner or later. Not

all of them, but still a good many, could be saved by placing the road in the hands of experienced managers at the start, with the local talent as understudies for a few years, if desirable.



MANUFACTURERS, railway men and others who have employed college graduates have had considerable trouble in securing men who demonstrated the abilities or qualities reasonably to be expected from college graduates, and some manufacturers after several experiments with college graduates have condemned the college man *per se*. Frederick W. Taylor in discussing the subject before the Society for the Promotion of Industrial Education pointed out that the central idea that the boy gets at college is training, training of the mind, storing the mind full of things, whereas for success in life mere intellectual training comes second or third. Mr. Taylor claims, and we believe rightly, that without the slightest question character comes first; good sense, second, and intellectual training third. His remedy for the conditions which result in lack of development of the first two qualities is for the young student to leave college at the end of the freshman year and spend at least one year in actual hard work in a shop of some kind, where he is certain to be under

constant supervision. Mr. Taylor says: "I would send them there mainly for the purpose of giving them a real look at life's work and give it to them early enough so as to affect the last three or four years of their college life. When they start work in a shop, under good rigid discipline, they then begin to get the character training, which is almost entirely lacking at college. They then begin to learn the great lesson of life, that almost nine-tenths of the work that every man has to do is monotonous, tiresome and uninteresting. Then they start to develop the character which enables them to do unpleasant, disagreeable things." The University of Cincinnati has endeavored to accomplish the same results which Mr. Taylor hopes to accomplish by his plan, through an arrangement whereby the students spend a portion of each year in actual work in commercial shops under conditions as nearly as possible the same as those of the other employees. Another way which we believe will be used to a greater extent in the future is that of taking young men who have already demonstrated the necessary qualities of character and good sense and sending them to college. These men, who are to be found in every shop of any size, it has been our observation have a keen desire for a college education and a lively sense of its value. They would be able to apply themselves to their college work with special attention to the subjects which refers to the work

they have been doing and propose again to do; their studies have a special significance and meaning with respect to their previous work. We believe that many large industrial concerns and steam and electric railways will in the course of a few years adopt a practice of taking promising young men from their ranks and sending them to college for the purpose of strengthening their organization in a most effective way.



PERHAPS it is premature and visionary to consider the possibility of a transportation system embodying as closely related parts not only the present steam railways and the high speed electric interurban railway, but also the more modest urban electric railways. However, no less a personage than Mr. George Westinghouse sees with apparent clearness the need of immediate attention to the adoption of a universal system of electrification and in his paper read before the recent joint meeting of the American Society of Mechanical Engineers and the Institution of Mechanical Engineers he discusses that subject from the standpoint of heavy electric traction and the electrified steam railways. Possibly Mr. Westinghouse considered that allusions to the future contingency of the smaller electric railways being involved would have a

tendency to weaken the force of his arguments for the adoption of a universal system of electrification. But that the city electric railways are surely going to have increasing occasion to interchange cars with each other and with the steam railways and that the practice is economical and utilitarian is clearly evident from an even cursory examination of properties where such a practice is already in vogue in a preliminary way as on the lines of the Indiana Union Traction or Illinois Traction Systems. On that account it is interesting to note that none of the requirements mentioned by Mr. Westinghouse as necessary for universal electrification would in any way militate against bringing the urban electric railways into the universal system. In fact it is because of the probability of such a condition arising that it will be worth while for every electric railway man to note the requirements and lend his support towards every effort for the adoption of a universal system. The fundamental requirements to insure interchangeability of traffic in steam operation are five: (a) a standard gauge of track; (b) a standard or interchangeable type of coupling; (c) a uniform interchangeable type of brake apparatus; (d) interchangeable heating apparatus; and (e) a uniform system of train signals. Electric operation introduces three further fundamental requirements: (f) a supply of electricity of uniform voltage and periodicity; (g) conductors uni-

formly located with reference to the rails; and (h) uniform apparatus for control of electric supply. Beginning with the first of these requirements, it is apparent that a manager who builds anything but a standard gauge line is in all probability adding a future financial burden. As far as the first requirement from a strictly electrical standpoint is concerned (f) three important systems are in use. These are: (a) the continuous or direct current system (commonly called the "third-rail" system), which employs alternating current for transmitting power when the distance is considerable; (b) the three-phase alternating current system with two over-head trolley wires; and (c) the single-phase alternating-current high-tension system with a single overhead trolley wire. The power-house equipment is essentially the same in the three systems, but the systems differ in the kind of motors and controlling apparatus used and in the methods and apparatus for current transmission. While Mr. Westinghouse does not undertake in his paper to advise the adoption of any one of the systems, it appears from the text and from certain diagrams in Appendix III of his paper that from the standpoint of current loss between generator and locomotive, first cost and operating cost, the single-phase system has the greatest advantages. But as stated before the subject is considered from the standpoint of heavy electric traction only.

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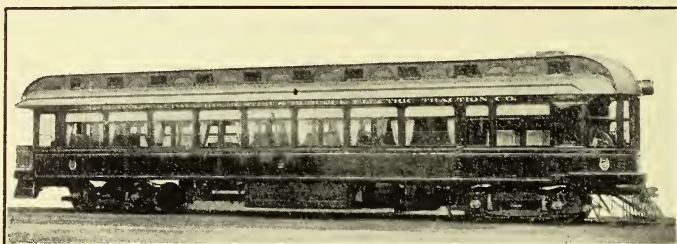
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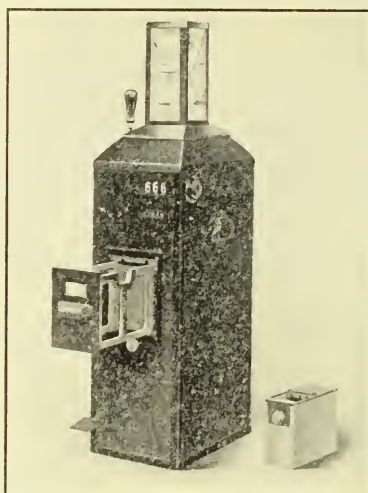
ALL-STEEL CAR BODIES

The reputation of The J. G. Brill Company in handling steel in truck construction is well known. Our facilities and ability extend to the use of steel in car construction as well. Two all-steel 60 ft. cars like the one shown above which were delivered from the Philadelphia plant recently compare favorably in construction with the heavy steel equipment used by the steam lines in express service. At Springfield several steel motor car bodies are under construction for one of the large electric companies which has developed a successful gas-electric motor car. A recent addition to the Philadelphia plant provides more room for the construction of steel underframes and cars. Send us your inquiries for steel equipment.

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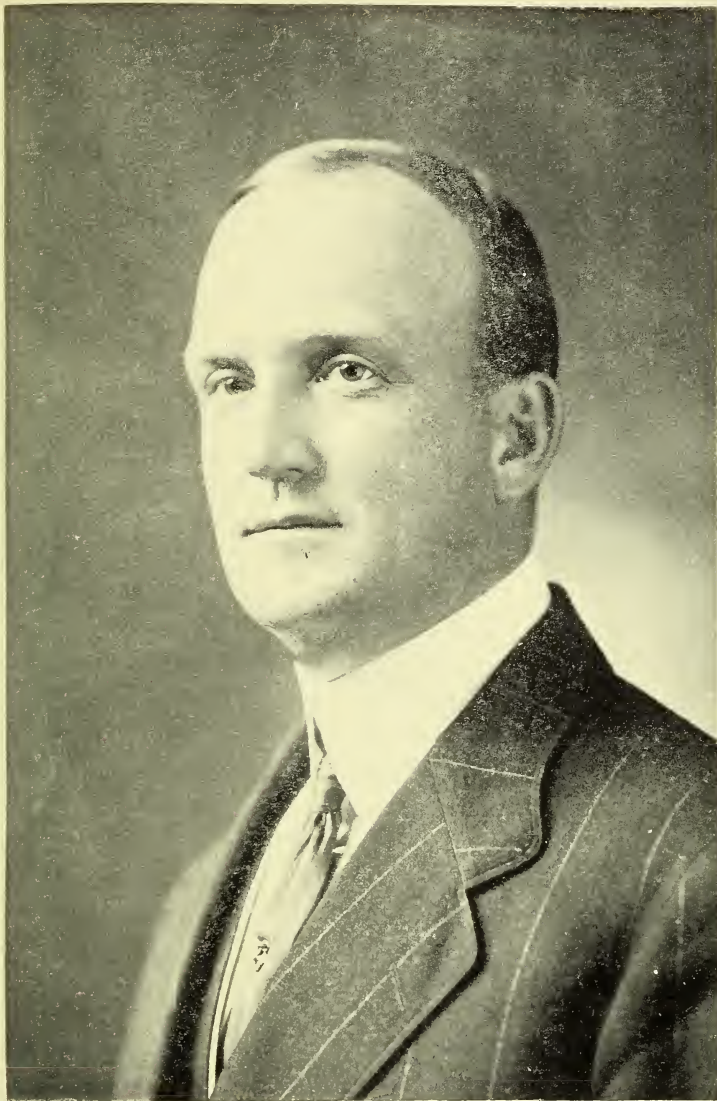




BRILL FARE BOX No. 1A

The advantages of the use of fare boxes in connection with prepayment cars have been so conclusively demonstrated that the question of the type of fare box best adapted to meet the requirements of your service should be the only one. Brill Fare Box No. 1A is equipped with both totalizer and register which are operated conjointly with the tilting plate on which the fares are deposited. A locked compartment with opening in the upper part of the main case is provided for envelopes containing transfers or trip reports. The pedal shown at the bottom of the fare box operates the tilting plate when the conductor is using both hands in making change and signaling.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



Leo, Uman



BRILL MAGAZINE

Vol. IV

OCTOBER, 1910

No. 10

JAMES F. SHAW

[WITH PORTRAIT INSERT]

JAMES F. SHAW, president of the American Street & Interurban Railway Association, was born in Newburyport, Massachusetts, in 1873, and was educated in the public schools. Early in 1891 he entered the employ of the Newport Car Company, first in the shops and afterward in the office. His first electric railway connection was with the Black Rocks & Salisbury Beach Street Railway Company as superintendent in 1891. In that capacity he served the road, which was operated only in the summer months, in 1891 and 1892, and in the interim devoted all of his attention to his interests in the electric railway supply business. Since 1893, Mr. Shaw has been connected with many electric railways. He has been the prime mover in the construction and operation of more than 600 miles of electric railway track, representing an investment of \$15,000,000. Included in this mileage were more than 25 distinct railways, connecting 55 municipalities scattered through the counties east of and including Worcester County, Massachusetts. Many of the railways are now embodied in the Massachusetts Electric system. At one time when about 25 years of age, he was president and general manager of thirteen different electric railways. He has been a director and president of savings and trust companies, director in coal mining companies, and has been interested in cotton mills, but has been specially active in the affairs of the American Street & Interurban Railway Association which he has so ably served as president during the past two years. Mr. Shaw is prominent in Massachusetts politics and was elected to the Massachusetts Senate in 1907 and was re-elected in 1908 and 1909. While in the Senate he served on the committees on Rules, Ways and Means, and Military Affairs, being chairman of the committee on Military Affairs for two years and chairman of the Ways and Means committee during the 1909 term.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

RICHMOND, VIRGINIA*

IN 1904 semi-convertible double truck cars were adopted as standard for the trunk lines in the city of Richmond, to take the place of single truck closed and open cars. The open cars, it had been found, could not be operated more than four months of the year and the closed cars which had 20-ft. bodies did not have carrying capacity to meet the requirements of the trunk lines. Aside from these considerations, an estimate of the maintenance expense and cost

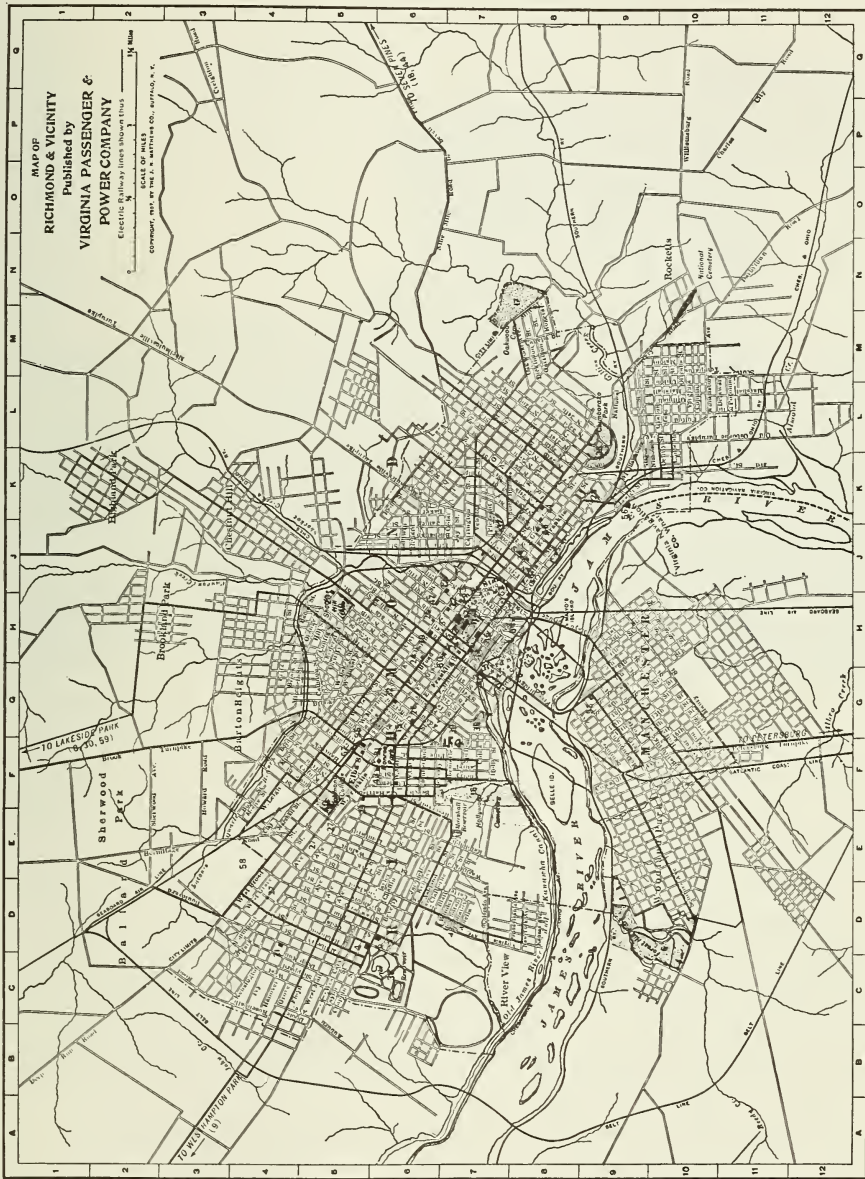


CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Earnings Have Increased Nearly 10 Per Cent. With the Operation of the Pay-As-You-Enter Cars—The Single Motor Truck Show a Saving in Current Consumption of 10 Per Cent.

of housing the double equipment showed the semi-convertible cars to be the most economical.

Since 1904 and until early in 1910 the standard of four motor semi-convertible cars was consistently adhered to and all purchases made from time to time were of that type, the open and closed single truck cars being displaced on all trunk lines and relegated to branch and cross-town line service and to use as trippers during rush hours and extras to handle park traffic. The double truck equipment was

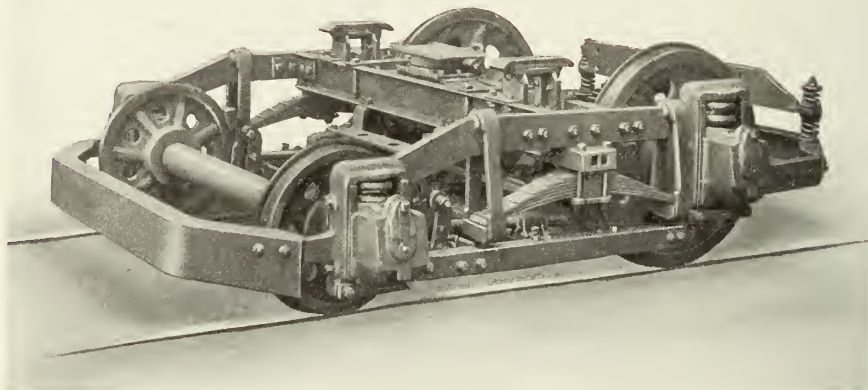
* This is the twenty-second in a series of articles, each of which discusses the tramway system of some important city of the world with particular reference to the type of car which is used.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Richmond Has a Population of About 125,000 and 120 Miles of Electric Railway Track—The Situation of the City on the Banks of the James River Creates Numerous Heavy Grades

all of average weight but in line with the tendency at that time towards large cars, most of the new cars had 32-ft. bodies.

In January 1910, additional equipment being necessary, it was believed that some of the recent developments in the car, truck and motor construction indicated the advisability of a change from the standard four motor equipment of semi-convertible cars and exhaustive tests were made. These tests included, on all the lines in the Richmond traction system, actual operation of a pair of Brill No. 39-E



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Brill No. 39-E 2 Truck Which Has Been Adopted As Standard for Richmond and is Being Used to Replace Some Two-Motor Trucks Has a 4 ft. 11 in. Wheel Base and A. S. I. R. A. Standard Axles

trucks under one of the standard cars for an extended period. During this time varying weather conditions from snow and sleet and muddy track to dry, clean track were encountered.

In addition comparative instrument tests were made for current consumption of the four-motor and two-motor equipment. The tests showed that the single-motor truck equipment met the operating requirements and that there would be a saving in current consumption by their use of at least 10 per cent. Needless to say the estimate of the maintenance expense of two-motor equipment showed a decided economy over four-motor equipment. In connection with the operating tests it is worthy of note that Richmond is situated on the banks of the James River and there are a number of grades, some of

them being as high as 8 per cent. and located on curves which, owing to traffic conditions, must be ascended from a dead stop.

The choice of a new standard car, it was felt, was largely governed by the cars already in service. The general public had become accustomed to the large 32-ft. cars and it was found, favored them because of the somewhat suppositious belief that they were roomier and more comfortable, whereas actual observation showed that the



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE
The Standard Pay-As-You-Enter Arrangement is Used With
5 ft. 10 in. Platforms of the Double-End Type

number of passengers carried per square foot of floor space averaged higher on the larger cars than on the small, because of the manner in which the travelling public would inconvenience itself in order to patronize the large cars. From an exclusively operating and maintenance standpoint a 28-ft. or 30-ft. car was favored. There was little question about the advisability of adopting the Pay-As-You-Enter feature because of the economic advantages and accordingly a car of that type with the following dimensions was decided upon:

Length of car body	32 ft.	0 in.
Length of each platform	5 ft.	10 in.
Length of car over vestibule	43 ft.	8 in.
Length of car over bumpers	44 ft.	11 in.
Width of car over side sheathing	8 ft.	2 in.
Width of car, extreme	8 ft.	5 in.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Interior Finish is Cherry and the Rattan Upholstered Seats are the Brill Winner Type—The Window Arrangement is An Adaptation of the Brill Semi-Convertible

The details of truck and electrical equipment and the figures for the weight of the cars are as follows:

Trucks	Brill No. 39-E
Motors	2 G. E. 65 h. p.
Weight	
Car body with fenders and air brakes	21,280 lb.
Trucks	12,280 lb.
Motors and electrical equipment	7,973 lb.
Total	41,533 lb.

The seating capacity is 46 persons which makes the weight per seated passenger 900 lbs. The seating capacity could be increased by the use of folding platform seats and end seats between the bulkhead doors, but Mr. C. B. Buchanan, superintendent of railways of the Virginia Railway & Power Co., after careful observation found that

seats of this sort, while normally increasing the seating capacity and being useful for that purpose under such conditions as those in New York City where the Public Service Commission requires a certain number of seats, were virtually obstructions and caused delays in operation at stops and that furthermore the space was more valuable as standing room. He accordingly very wisely decided to omit them but included the end seats near the entrance doors to reduce to a minimum the loss in seating capacity from the prepayment door arrangement.

It is impossible in the scope of this article to take up in detail every minor feature of the car, which in the aggregate indicate a careful consideration of the convenience and pleasure of the travelling public and also of operating economy. The following table showing comparative receipts on the Broad and Main line before and after the entire new equipment of 20 Pay-As-You-Enter cars were placed in service, is of particular interest.

BROAD-MAIN LINE

	Earnings	Cash Fares	Tickets	Passengers Transfer	Passengers Total
P-A-Y-E Sept. 19, 20, 21	\$2225.95	11524	41812	15554	68890
3 days preceding week	2070.40	8889	41142	15658	65689
3 days preceding year	1823.25	7822	36406	11940	56168

MAIN STREET LINE

September 19, 20, 21	\$2036.26	9270	41171	15316	65757
3 days preceding week	2085.71	9460	42031	15669	67160
3 days preceding year	1885.08	8650	37909	13764	60323

The new cars were first operated on Sunday, September 18, 1910. The figures are for the following three days compared with the three corresponding days of the preceeding week and the same week-days exactly one year previous when the old type equipment was used. The figures for the Main street line are presented because the Main street cars are operated for a large portion of their route over the same streets as the Broad and Main cars and the decrease in earnings on the Main Street line consequently indicate fairly well the portion of the increase on the new Pay-As-You-Enter cars which is due to "curiosity" riders. The increase in cash fares and actual decrease in transfers on the Pay-As-You-Enter cars are significant features. In this connection it is worthy of note that the cars were operated with fare boxes.

MOTOR CAR FOR THE SOUTHERN RAILWAY

GAS-ELECTRIC SYSTEM

SEVERAL previous issues of Brill Magazine have described types of motor cars for light branch line service on steam railways and for owl service on electric railways. Some new lines have acquired cars of this type to develop sufficient traffic to warrant electrification or the purchase of locomotives. Most of the cars for those classes of service have been of the straight gasoline type with mechanical transmission between the combustion motor and the



MOTOR CAR FOR THE SOUTHERN RAILWAY—The Car Body is of Steel Construction and Weighs 26,500 lb. Exclusive of Any Equipment

wheels and the cars have been of comparatively moderate size. There is a demand for larger cars on steam railways and on some of the newly constructed electric railways, which have a fairly heavy interurban service. The car shown in the accompanying engravings was designed to meet those requirements. The car body, which was built by the Wason Manufacturing Company, is propelled by electricity. A gasoline engine direct coupled to an electric generator forms a compact power plant in a compartment located in the front of the car. The electric power thus generated is applied to standard railway motors mounted upon the axles. The car is operated by means of a suitable controller in a manner similar to ordinary trolley cars. The advantages claimed for this system are universal speed control which is powerful, efficient, light, reliable and noiseless.

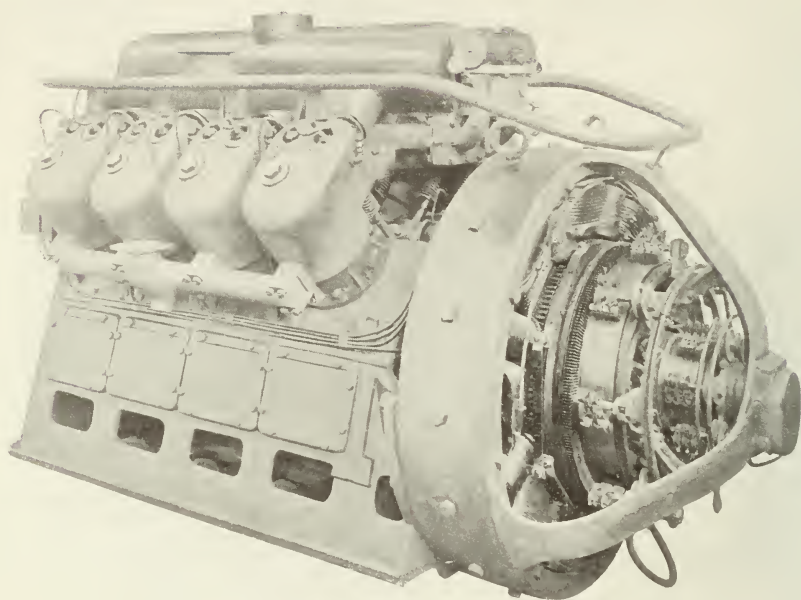
The car body is 54 ft. 8 in. long and 9 ft. wide. The underframe is of structural steel, the center sills being 6-in. I-beams, the side sills 6-in. channels and the cross joists 4-in. channels. The side posts are 2 by 2 by $\frac{1}{4}$ -in. tees and the rafters $1\frac{1}{2}$ by $1\frac{1}{2}$ by $\frac{3}{16}$ -in. tees, the roof being of plain arch construction in order to effect a saving in weight. The window rail is $2\frac{1}{2}$ by $1\frac{1}{2}$ by $\frac{7}{16}$ in. The weight of the



MOTOR CAR FOR THE SOUTHERN RAILWAY—Interior of the Main Saloon Compartment Showing the Plain Arch Roof With Ventilating Louvres—There is Also a Smoking Compartment

car body without seats or any electrical or engine equipment is 26,500 lb.

The power plant consists of an 8-cylinder 550 r. p. m. 4-cycle gasoline engine of the V type, direct connected to an 8-pole 600-volt commutating pole electric generator and an 80-volt exciter. The generator and exciter are built by the General Electric Company in accordance with their standard practice and are specially designed to meet the conditions of service. The eight engine cylinders are 8-in. bore by 10-in. stroke and are made of a fine quality of grey iron.



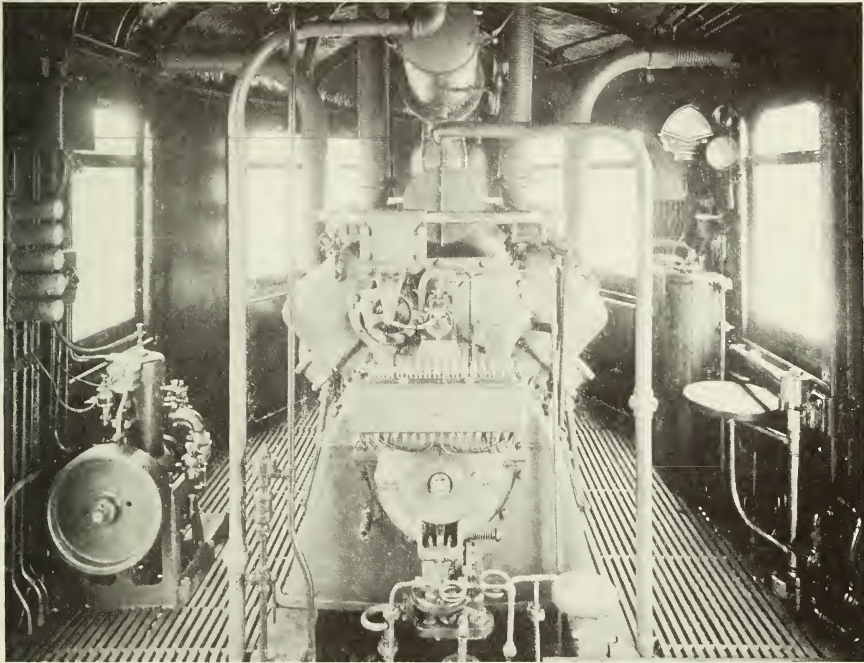
MOTOR CAR FOR THE SOUTHERN RAILWAY—The Power Plant is So Compact That it Occupies A Compartment Only 11 ft. 5 in. Long

The exhaust and inlet valves, air starting valves and spark plugs are mounted in the cylinder heads which are thoroughly water-jacketed and secured by four large studs tapped directly into the crank case.

The gasolene is taken from a 100-gallon tank suspended under the car. Strainers are provided at the point where the tank is filled, and also between the tank and pump on the engine, making it impossible to obstruct the carburetor with foreign matter. A hand pump is also supplied for pumping gasolene when the engine is not in motion. A small auxiliary tank mounted on the wall of the cab provides gasolene for the float feed carburetor on the auxiliary engine. The ignition system consists of two Bosch low tension magnetos and magnetic plug.

The engine is started by means of air taken from the main reservoirs of the air brake system which are made of extra large capacity for this purpose. During the operation of the main engine the air reservoirs are charged by a single cylinder $4\frac{3}{4}$ by 4-in. air compressor

driven from the crank shaft of the engine. This compressor has a displacement of 22.5 cu. ft. of free air per minute when running at 550 r. p. m., and is provided with an automatic governor which holds the intake valve open when pressure in the reservoir reaches 90 lb.



MOTOR CARS FOR THE SOUTHERN RAILWAY—The Engine Room—The 8-Cylinder Gasoline Engine is Direct Connected to an 8-Pole Commutating Pole Generator

The car is mounted on trucks of the M. C. B. type. The forward truck is equipped with two standard 600-volt commutating pole railway motors of 100 h. p. each. The motors are mounted directly upon the axle with nose suspension and are equipped with standard gears and gear cases. The car body has a seating capacity of 61, of which 20 are accommodated in the smoking compartment and 41 in the main saloon.

PRIVATE CAR FOR MR. C. D. BEEBE

BUILT BY THE G. C. KUHLMAN CAR COMPANY

PROBABLY the finest private car in service on any electric railway to-day is the car for Mr. C. D. Beebe of Syracuse, N. Y., whose interurban properties radiate from that city to Auburn, Rochester and other surrounding cities. The car was recently delivered from the shops of the G. C. Kuhlman Car Company at Cleveland where it was built and equipped. It has the following dimensions:—

Length over vestibules	54 ft. 8 in.
Length over bumpers	56 ft. 0 in.
Width over sills including sheathing	8 ft. 4 in.
Width inside of car below windows	7 ft. 5 $\frac{3}{4}$ in.
Height top of rail to top of roof	12 ft. 10 $\frac{3}{4}$ in.

The car is designed for operation with its own motor trucks and included in the eight compartments into which the car body is divided are two for the motorman at diagonally opposite corners of the car. The remaining portion of each end has a large observation window, a lounging or smoking compartment being located at one end of the car and a handsomely fitted parlor compartment at the other end. The other compartments are a kitchen and a dining room, the kitchen located between the dining room and the smoking compartment; a toilet and lavatory and a retiring room. A passage way connects all compartments in such a manner that it is only necessary to pass through the dining room to get from one end of the car to the other.



PRIVATE CAR FOR MR. C. D. BEEBE—Mounted on Temporary Trucks for Photographing

The car is most substantially built as well as being most handsome in interior finish and accoutrements. The framing includes the Kuhlman steel plate girder narrow side construction. Each side sill is built up of $3\frac{1}{2}$ by 7-in. angle, a 24 by $\frac{3}{8}$ -in. steel plate and a 7-in. channel with a $3\frac{1}{4}$ by $8\frac{1}{2}$ -in. yellow pine sill. The center and intermediate sills are 6-in. I-beams (12.25 lb. per ft.) with Georgia pine fillers.



PRIVATE CAR FOR MR. C. D. BEEBE—Interior of the Parlor Compartment Which is Finished in African Mahogany

There is placed under the side sills a $1\frac{3}{8}$ -in. truss rod which is anchored to the car body bolsters with heavy wrought iron anchors. The needle beams have $\frac{3}{4}$ -in. truss rods. The inside truss are of $2\frac{1}{2}$ by $\frac{3}{8}$ -in. wrought iron running the full length of the car body and down through the sills at either end and through forged corner sill plates which have upward extending flanges over the end sills. The bolsters are built up from steel plate and castings. The top plate is 10 by 1-in. steel and the bottom plate 10 by $1\frac{1}{8}$ -in. steel.

The body framing has double posts between each pair of windows. These are ash, as are the corner posts, $1\frac{3}{4}$ by $4\frac{3}{8}$ -in. securely tied together. The intermediate posts in the center of the double windows are $1\frac{3}{4}$ -in. thick. All the corner and side posts have $\frac{1}{2}$ -in. rods through the side sill and the top of side plate with nuts and washers on each end. The side window sills are white ash. The sheathing under the window sills and on the sides of the car is $\frac{3}{4}$ -in. Southern poplar.



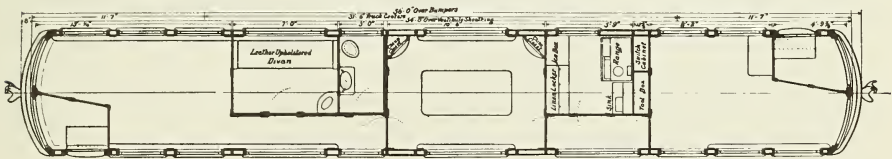
PRIVATE CAR FOR MR. C. D. BEEBE—The Dining Room is Finished in Mahogany with Beamed Ceiling

The roof has 17 steel carlines of $\frac{1}{2}$ by $1\frac{1}{2}$ -in. material. The lower ends of these have feet forged on them and bolted to the top plate. The upper roof is covered with $\frac{1}{2}$ -in. tongue and grooved Southern poplar and the side roof with $\frac{1}{2}$ and $2\frac{1}{2}$ -in. sheathing. The roofs are covered with No. 8 cotton duck over screen. The usual copper gutter is provided over the doors and iron molding around the end to protect the hood from the trolley rope.



PRIVATE CAR FOR MR. C. D. BEEBE—Looking Through the Passage-way to the Parlor Compartment from the Smoking and Lounging Compartment

The arrangement of the motorman's cabs is shown in the accompanying plan. The floor of these cabs is covered with interlocking rubber tiling including the trap door covering over the step entrances. A folding theatre stool is provided in each cab. The smoking or lounging room is finished in Mission oak with a cabin deck type of ceiling. The compartment is furnished with a number of leather upholstered chairs of suitable design and in one corner of the room there is a writing desk. Folding wall tables are provided for both this com-



PRIVATE CAR FOR MR. C. D. BEEBE—Plan Showing Arrangement of Compartments

partment and the parlor compartment at the other end of the car. The kitchen is located next to the smoking or lounging room and is finished in white enamel. Its equipment includes a combination buffet range embodying oven, broiler and hot water heater; an ice box to hold 75 lbs. of ice and a reasonable amount of provisions; a copper covered sink with shelves above and a copper covered serving board beneath



PRIVATE CAR FOR MR. C. D. BEEBE—Another View of the Smoking and Lounging Room Which is Finished in Mission Oak With Cabin Ceiling

which are lockers for the storage of food supplies. There is ample storage room in the kitchen for utensils, dishes, glassware and linen. The floor of the room is covered with interlocking rubber tiling.

The dining room is finished in selected African mahogany with plain line inlay. The room has two china closets and its furnishings include a table large enough to seat eight persons at one time. The ceiling in the room is of beam design.

The toilet room is finished in white enamel in imitation of tiling

and has a marble floor. The fittings are handsomely finished and the lavatory has hot and cold water connections with the kitchen heater. The dividing wall between the toilet and dining room is double and deadened. Next to the toilet room is a retiring room with leather upholstered davenport and a lavatory. This compartment does not occupy the full width of the car and is entered by a door from the passageway at the side.



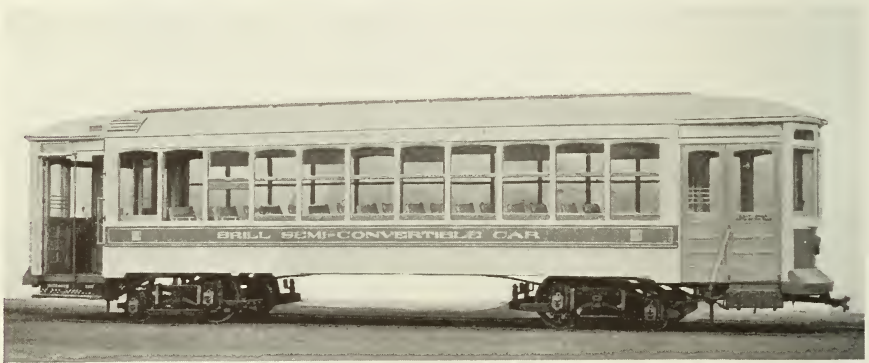
PRIVATE CAR FOR MR. C. D. BEEBE—A Corner of the Retiring Room

The parlor compartment is finished in African mahogany and has a full empire ceiling. The floor is deeply carpeted and the room furnished with wicker chairs of attractive design having deeply tufted cushions. The lighting fixtures are of special design. The curtains are silk pantasote and there are draperies at the low end observation window. The windows in this and the other compartments are double and there is an ample supply of electric heaters throughout the car. Off of the lounging room is a fairly large clothes closet.

EXHIBITION CAR AT A. S. I. R. A. CONVENTION

BRILL PLAIN ARCH ROOF

THE car built by the J. G. Brill Company for the exhibition of the American Street & Interurban Manufacturers' Association is a light weight type which introduces the Brill Plain Arch Roof and includes the company's semi-convertible window system. In addition the car has pay-as-you-enter platforms, a vacuum ventilating system, the latest type of seats and is



EXHIBITION CAR AT A. S. I. R. A. CONVENTION—At First Glance the Only Evident Departure to Secure Light Weight is the Brill Plain Arch Roof

mounted on single-motor trucks which have the most recent improvements. All-in all this car is the embodiment of the latest and most widely approved principles developed by modern city conditions.

The greatest advance in the progress of city cars during the last ten years have been the semi-convertible car, the pay-as-you-enter system and the light weight car. In recent years the importance of eliminating unnecessary weight from cars has received considerable attention and the car exhibited may be considered as the result, up-to-date, of the Brill Company's developments along this line, although there has been no attempt in this case to reduce the weights to the minimum.

As will be seen by the illustration of the car, the appearance is distinctly characterized by the Brill Plain Arch Roof, which of course must be seen a number of times to rid the mind's eye of the lack of the monitor and enable one to correctly realize the appearance presented by the novel simplicity of the roof lines. Aside from the effect which the plain appearance of the roof has at first upon the observer, the Brill Roof has no disadvantages as compared with the monitor but

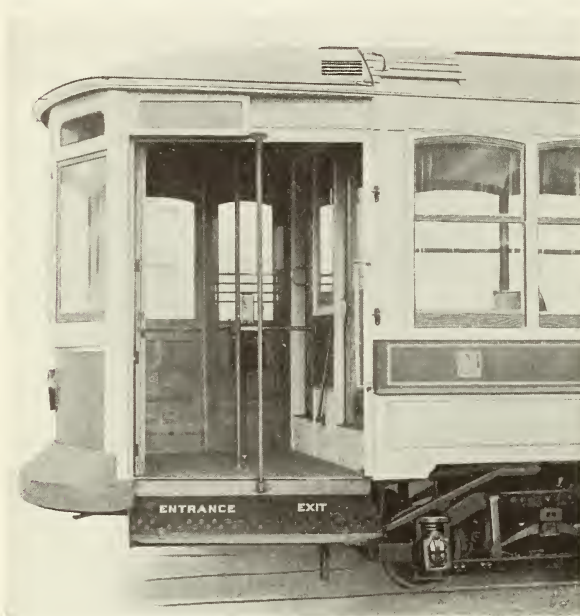


EXHIBITION CAR AT A. S. I. R. A. CONVENTION—A Comparatively Short Acquaintance With the Brill Plain Arch Roof Convinces One of the Superior Interior Appearance Which It Gives As Well As of Its Structural Advantages

instead has a number of important advantages over the old form in addition to its lighter weight. The chief reason that the Brill Roof is lighter is that the plain arch is inherently strong where the monitor is weak. The shape of the monitor is anomalous in a construction where strength and lightness are so essential as in a car body. The Plain Arch Roof has no joints—the monitor has four. Therefore to overcome the weakness of the monitor a heavy construction has been required which being eliminated in the Brill Plain Arch Roof, the weight

is reduced about one-half. The Brill Roof has therefore been incorporated as the logical accompaniment to this light weight car.

The semi-convertible window system is also particularly adapted to light weight cars as the absence of the wall window pockets permits a



EXHIBITION CAR AT A. S. I. R. A. CONVENTION—The Ventilating Apparatus Is Located Under the Platform Hood and One of the Outlets for the Foul Air Is Shown Above the Exit

lighter side construction than possible with a drop sash window arrangement. In the standard semi-convertible car the window openings are higher than with any other window arrangement; the Brill Roof permits the windows to be $4\frac{1}{2}$ inches higher than standard, which adds very much to the appearance of the car from the outside and to the brightness of the interior.

The Brill Roof lends itself to a vari-

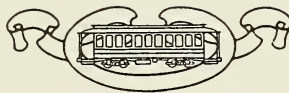
ety of forms of ventilation. In this instance the system is that of the Vacuum Car Ventilating Company. It consists of a motor driven fan which exhausts the air through eight registers in the head lining, the air passing between the head lining and the roof to the motor driven fan which is placed on the end facia at one end of the car and passed out through ducts with openings in the end. Natural draught ventilators of the Globe type have been used in cars with the Brill Arch Roof built for Houston Electric Company, Northern Texas Traction Company, and Ogden Electric Company. The vacuum system mentioned is being installed in interurban cars under construction at present at the Brill plant for the Chicago & Joliet Railway and is also used on the cars of the

Peoples' Electric Railway of Dayton. The exhibition car is given a complete change of air every $3\frac{1}{2}$ minutes by this system, i. e., the cubical contents of the car body is 1600 cubic feet and the displacement by the fan is 28,000 C. F. H., which equals 3.44 minutes per 1600 feet. The air is brought in under the car through netted openings and over electric heaters and exceeds in amount of air the requirements of the health department of one of the largest cities in the country which specifies that not less than 350 cubic feet of air per hour shall be provided per passenger based on the maximum carrying capacity of the car which shall be estimated at not less than eighty passengers.

The platforms are of the standard pay-as-you-enter type with folding doors and automatic folding steps. Hunter signs are placed over the central vestibule sash and over the entrance door and a light is placed over the exit door which gives a clear view of the exit step at night. The seats are of the Brill "Winner" type with one-piece pressed steel pedestals and pressed steel aisle and wall plates. The car is mounted on Brill No. 39-E trucks having the latest improvements in brake rigging, bolsters, transom irons and frame extensions and are similar to those recently furnished to the Metropolitan Street Railway of New York, Capitol Traction Company of Washington, D. C. and the Virginia Railway & Power Company of Richmond.

The general dimensions of the car are as follows:

Length over corner posts	30 ft. 8 in.
Length over platforms	42 ft. 8 in.
Length of platforms	6 ft.
Width over sills, including panels	7 ft. 10½ in.
Width over posts, at belt	8 ft. 2 in.
Extreme width	8 ft. 3½ in.
Height from track over top of trolley boards	11 ft. 7½ in.
Centers of posts	2 ft. 8 in.
Seating capacity	41



SINGLE TRUCK CARS FOR DAYTON, OHIO

BRILL PLAIN ARCH ROOF

STILL another type of car with the Brill Plain Arch Roof is shown in a lot of five single truck Pay-As-You-Enter cars built by the G. C. Kuhlman Car Company for the Peoples Railway Company of Dayton, Ohio. These cars exhibit the same pleasing interior and symmetrical exterior as the light weight car with Brill roof which is exhibited at the Convention of the American Street & Interurban Railway Association and described on another page of this issue. A mechanical exhaust system of ventilation is used for both types of cars.

The Dayton cars have straight sides and longitudinal seats. The windows are arranged with double sash, the top one of which is stationary and the lower arranged to raise. Each car has the following dimensions:—

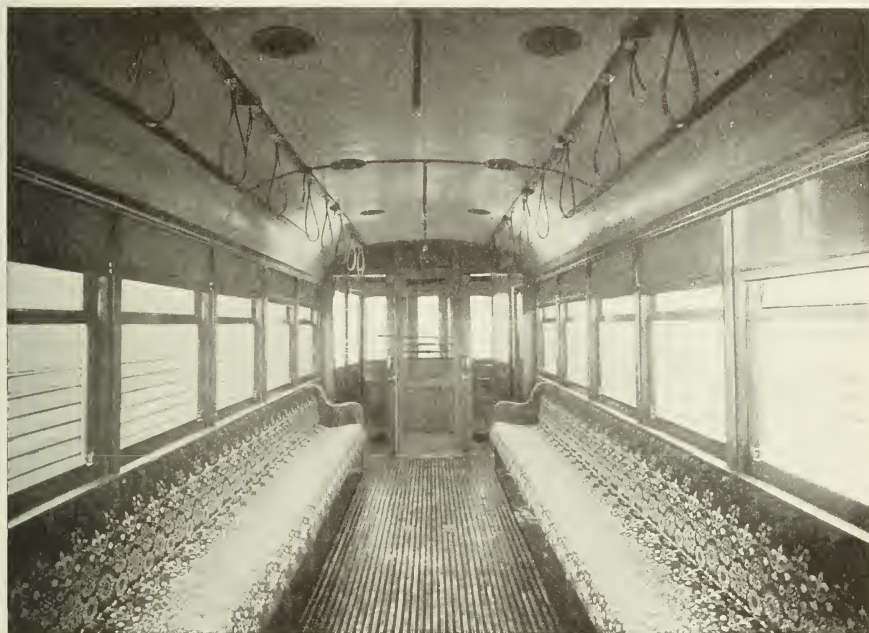
Length of car body over end panels	20 ft. 0 in.
Length over vestibule sheathing	34 ft. 0 in.
Width at sill including panels	8 ft. 0 in.
Height from rail over trolley boards	11 ft. 3 in.

The Pay-As-You-Enter doors in the bulkheads at both entrance and exit slide towards the center of the car. The platforms are com-



SINGLE TRUCK CARS FOR DAYTON WITH BRILL PLAIN ARCH ROOFS—The Cars are the Pay-As-You-Enter Type and Have Full Vestibules With Mutually Operating Sliding Doors and Steps
The Car is Mounted on a Temporary Truck for Photographing

pletely vestibuled and are the double end type. The door on the brake shaft side of the car is located at the crown piece and the door on the controller side next to the corner post of the car body. The doors do not slide into a pocket such as is frequently built, but slide past the inside panel. All four doors are fitted with a mutually opera-



SINGLE TRUCK CARS FOR DAYTON, OHIO, WITH BRILL PLAIN ARCH ROOFS—The Ventilating Registers in the Ceiling Open into an Air Chamber Between Ceiling and Roof—The Foul Air is Withdrawn Through these Ventilators by a Motor Driven Exhaust Fan

ting device in connection with the folding step which is so arranged that the step lowers before the opening of the door exceeds twelve inches. Each platform is 6 ft. $6\frac{1}{2}$ in. long.

The cars have 4 by $7\frac{3}{4}$ -in. side sills which are reinforced with 12 by $\frac{3}{8}$ -in. steel plate. The wheel pieces are $4\frac{1}{4}$ by 7 in. reinforced with 7 by $\frac{3}{8}$ -in. plate and the end sills are white oak $3\frac{1}{2}$ by $9\frac{1}{4}$ -in. reinforced with 7-in. channels. The white oak center cross joist is reinforced with 4 by $\frac{1}{2}$ -in. plate. The ends of the cars are protected with Brill angle iron bumpers.

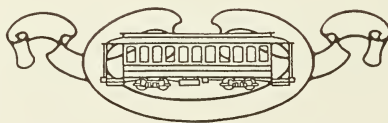
The Brill Plain Arch Roof is strengthened with the usual concealed steel rafters $\frac{5}{8}$ -in. thick. A space of 4 in. is allowed between the roof boards and the ceiling for the air space and ventilators which exhaust the air from the car by means of a motor driven fan located in a housing under the platform hood. One of the exhaust openings is shown in the side elevation view of the car.

The interior finish of the cars is cherry and the ceiling is composition board. The longitudinal seats are covered with Wilton carpet. There are two lockers under the seats at diagonally opposite corners of each car. The seats are supported with plain legs and under them are truss plank electric heaters through which the incoming cold air passes from intakes in the floor.

The special equipment of the cars includes Brill Dedenda pedal alarm gongs under each platform and Brill patented signal bells. The figures for the weight of the car are as follows:—

Car body	14,100 lbs.
Truck	6,940 lbs.
Motors	6,540 lbs.
Total	27,580 lbs.

The truck has a 7-ft. 6-in. wheel base and will be used on track with minimum radius of curve 35 ft. The track gauge is 4 ft. 8½-in. and the wheel diameter 33 in.



EQUIPMENT FOR THE CITIZENS RAILWAY, WACO, TEXAS

ONE-MAN PREPAYMENT CARS

DURING the month of June there were delivered to the Citizens Railway Company of Waco, Texas, by the Danville Car Company three single truck cars for one-man prepayment operation. Since the cars were placed in operation very gratifying results have been obtained and the indications are that the accident expense will be reduced to about one-half the former figure; that the gross receipts will show an increase of about 10 per cent. over the receipts of the old cars under the former methods of operation, due, the management believes, to the greater popularity of the new cars and service; that practically all of the fares are now collected and turned over to the company, whereas under the old system at least 5 per cent. were missed; that there will be a saving of about 6 per cent. in trainmen's wages by building and operating the car so that one man is at all times sufficient for its proper handling.

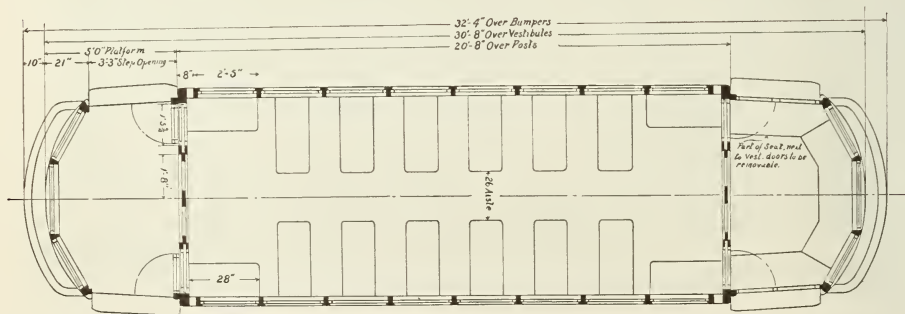


EQUIPMENT FOR THE CITIZENS RAILWAY, WACO—The Vestibule Doors on the Back Platform Are Closed and Locked and the Steps Are Removed—The Trainman on the Front Platform Serves Both as Motorman and Conductor

Waco, Texas, is a city of 30,000 inhabitants. As in most cities of approximately the same size the traffic and earnings of the street railway system are not sufficient to justify the employment of conductors on cars. However, when unaided by a conductor the motorman is required not only to watch the tracks and operate the car, but to watch the entrance and exit of passengers and to see that their fares are collected and that the necessary transfers are issued. Under these conditions the service can hardly be made rapid or satisfactory, fares are missed in abnormally large numbers and legitimate and other claims on account of accidents accumulate at a rapid rate. The accident and legal accounts of small roads operated in this manner are usually excessively high because it is difficult for the company to successfully defend the claims in the absence of a conductor or other witness, to disprove the statements made by the plaintiff who is frequently unprincipled. The compromise plan of having conductors on cars during rush hours involves maintaining a force of extra men, at considerable expense, who are not as efficient as regular conductors and to whom it is difficult to offer employment sufficiently attractive to retain them in service for any length of time. The cars shown in the accompanying engravings were designed to meet these conditions. Each car has the following dimensions:

Length of body over corner posts	20 ft. 8 in.
Length of each platform	5 ft. 0 in.
Length of car over bumpers	32 ft. 4 in.
Width over sills	8 ft. 2 in.

The car is entered through the right-hand door on the front platform, where the fare is deposited by the passenger in a fare box.



EQUIPMENT FOR THE CITIZENS RAILWAY, WACO—The Semi-Circular Bench on the Back Platform Seats Eight to Ten Persons—The Platform is Used for a Smoking Compartment

The body of the car, which is particularly roomy adjoining the doors, is used in the regular way, provision being made for negroes on the rear seats in the main portion of the car, when it is to be used in the Southern States. The steps of the rear platform are entirely removed, and the doors are closed and locked. A shield protects the rear bumper, leaving no overhanging parts on which boys or others



EQUIPMENT FOR THE CITIZENS RAILWAY, WACO—Interior View Showing the Bench for Smokers on the Back Platform

may sit or hang. In addition to the regular sash on the doors and windows of the rear vestibule, which can be opened or closed at will, there are screens to prevent entrance or exit through these openings. A semi-circular bench, seating from eight to ten persons, is a part of the regular equipment of the rear platform, which is utilized as a smoking compartment. This feature increases the seating capacity of the car considerably, and has proven to be very popular. The passengers leave by way of the front platform, passing out the right-

hand door, under ordinary conditions, although on single tracks and in times of heavy traffic the left-hand front door is available as an exit. Transfers are issued when desired as the passengers leave the car, a

transfer-issuing machine being employed for this purpose.

With the natural tendency on the part of passengers to congregate on the rear platform this method assists materially in distributing the passengers evenly throughout the car and in utilizing the car to its full capacity without causing passengers to suffer discomfort from crowding. The issuance of transfers as the passengers leave has not been found to delay their exit perceptibly, and has proven satisfactory in every particular. The fare box



EQUIPMENT FOR THE CITIZENS RAILWAY, WACO—All Passengers Board and Leave by the Front Platform and Deposit Their Fares in a Brill Fare Box

which is used for the collection of fares is the Brill No. 4-A type. Each trainman on starting out is given a supply of change and additional change can be obtained from the office, which all but two lines of cars pass. An office employe meets the cars of the other lines at intervals in order to furnish the trainmen with change. With only one entrance and exit to watch, and with that close at hand, and with the burden removed of collecting fares and issuing transfers, the motorman is able to devote his whole attention, while the car is in motion, to its operation.

BRILL MAGAZINE

Published on the fifteenth
of each month by the

PUBLICITY DEPARTMENT OF THE J. G. BRILL COMPANY

In the interests of The J. G. Brill Company, American Car Company, John Stephenson Company, G. C. Kuhlman Car Company, Wason Manufacturing Company, Danville Car Company, Compagnie J. G. Brill.



ON another page of this issue is presented a description of a light weight car which The J. G. Brill Company is exhibiting at the convention of the American Street & Inter-urban Railway Association. The car is neither the lightest car yet built nor is it the final word in light weight construction. But we believe that it is the lightest car that can consistently be built in keeping with established principles of design and construction and with reasonable assurance of sufficient strength to withstand the usual length of service without requiring more than the average maintenance expense. Unfortunately nothing but service will demonstrate how well we have considered every point in the construction of the car. But every point has been carefully considered. The clamor for light weight cars began over a year ago and has waxed louder each month. During this time rather than rush forward with a hastily de-

signed light car we have preferred to examine carefully the suggestions and attempts of others, meanwhile working out various designs of our own and comparing them point for point with each other and with existing construction which had demonstrated its qualities in service. The result of our efforts is to be found in the Brill Plain Arch Roof Car. The most radical departure from previous standards of design is the roof which we believe is an advance in more ways than one and is destined to be generally adopted for city electric railway cars. Yet this new feature by no means gives the car an appearance of a freak. The roof construction is a considerable factor in weight saving. Others are the underframing which is largely steel and the patented channel knees. But principally there has been a saving of weight by reducing the weight of a large number of individual items. Further saving can be effected but we are not yet ready to recommend it.



NO influence has had greater force in developing light weight equipment than the increased cost of operation. With inability to meet this increase with increase in fare, the need for reducing operating expenses has grown more insistent each month, if not each day, and light weight equipment is only one of the means which

have been hit upon. The question is, how long will it be before all of the different paths to a reduction have been exhausted. Doubtless American inventive genius and executive ability will develop many devices and means to help, but it is apparent even now that these are not being found with sufficient rapidity to maintain earning capacity or even a fair return on investment. In the face of this economists tell that the cost of living for railways as well as for people will continue to advance and that rates of fare will advance slowly if at all. What is to be done? We have already pointed out that the increased efficiency of operation is the principal remedy. But it is not too early nor a hopeless task to commence work for increased rates of fare. Encouragement may be taken from the accomplishments of the steam railways along this line which already give evidence of bearing fruit. Unless signs fail the interstate carriers will have permission to advance rates at an early date. This permission, however, has not been obtained without effort and it has only been obtained by the co-operation of the principal interests concerned in the welfare of the railways. The railways themselves are maintaining a publicity bureau at Washington, the manufacturers and dealers in railway supplies have organized the Railway Business Association which has carried on a campaign of education among the employees of its members to convince

them, and through them the public, that agitation and legislation against the railways is a menace to their own and the public prosperity. The railway employes through their brotherhoods and unions have joined in petitioning for the permission asked by railways themselves. With all this organization and co-operation the hoped for increases in rates are for the most part still to be obtained. Perhaps they would have been obtained earlier if the railways had begun to marshal their forces sooner. At any rate it will be well for some of the leaders in the American Street & Interurban Association to consider the wisdom of developing the machinery to assist them in the critical period when an advance in rates will be an absolute necessity and when, unless it is convinced of its justness, the public will refuse to permit it. Some of the electric railways are already doing individual work along these lines. Co-operative efforts would be more effective.



ABOUT the time this issue of Brill Magazine makes its appearance The J. G. Brill Company will mail to the technical schools, universities and colleges throughout the country the third annual announcement of its \$500 prize offer for senior theses on subjects connected with car design. The first contest in 1908-1909 resul-

ted in some very meritorious designs for city cars and of the prize winners one is now in the electric railway supply business, one is with the Boston Elevated Railway and the third entered steam railway work. Encouraged by the first year's success, the prize offer was renewed in 1909-1910, but unfortunately through a misconception of the time when the senior students commenced their thesis work the announcement was not issued until after the students had chosen their thesis subjects and done considerable work. The result was no entries in the contest. Profiting by the mistake, this year's announcement is issued practically at the commencement of college and provision is also being made at this time for the following year's contest by the announcement that the prizes will be continued again next year. Thus the senior students of the present year will be advised in ample time and the junior students will have an opportunity to do research work in preparation for next year's contest. We believe that the arrangement is one which electric railways which are anxious to add promising young technical graduates to their forces will find of advantage. Arrangements can be made with the technical schools for the employment of students, now juniors, during the summer of 1911. These students, it is believed, will have a peculiar interest in their work because of the opportunity presented for a study of the relation of practical operation to car design and the elec-

tric railways will have an opportunity to determine whether the students have the character and ability which is requisite. Should the latter be the case, arrangements can be made with students for special college electric railway work during their senior year in anticipation of their return to permanent positions following graduation. We shall be glad to hear from the official of any electric railway who is inclined to co-operate with us in our plan for attracting to the electric railway field the better class of college graduates, to the extent of accepting one or two technical students for employment on a probation basis during the summer months of 1911. An effort will be made to secure the services of only such students as have made special preparation for electric railway work, by personal correspondence with the heads of the principal institutions. We shall also be glad to hear from college professors who wish to place properly equipped students with electric railways for summer work.



SEVERAL months ago we referred in these columns to the use of car meters abroad for the purpose of securing economy in energy consumption at the car. Since that time a paper has been read by Mr. H. St. Clair Putman before the American

Institute of Electrical Engineers on the subject of economy in electric car operation, which discussed principally the use of current clocks, and before the International Street & Interurban Railway Association at Brussels a paper on wattmeters and other current recorders for cars was read by M. Battes, manager of the Municipal Tramways at Frankfort. The Tramway & Railway World of London has also published in its columns a number of communications from users of car meters in Great Britain. All of these articles and reports indicate benefits from the use of the different devices. On the continent the current clock seems to be favored, while in Great Britain wattmeters are more largely used. The cost of a current clock abroad is about \$10.00 and the economy of current consumption varies from five to nearly nine per cent. Wattmeters cost from \$25 to \$50 and the reports of the saving in energy vary from 5 $\frac{3}{4}$ to 16 per cent. Besides the reports of the current consumption some other interesting things have been developed. An increase in schedule speed has been secured and motor and brake shoe maintenance has been reduced. There has been some tendency on the part of motormen to accelerate too rapidly, but such devices as the controller handles have overcome the difficulty. In the light of these observations we repeat our suggestions that it will be well for American managers to make trials of various current recording devices.

THERE is little doubt about the ultimate adoption of prepayment cars on every city electric railway. Some managers, however, for various reasons will find it impracticable to add the new type of equipment for some time to come and possibly these will be glad to know that if they will take the effort to establish the "leave by the front door" practice they will be establishing a good basis for the introduction of their Pay-As-You-Enter cars and will at the same time accomplish many of the things effected by the use of prepayment cars. One manager made secret service observations and found that a large percentage of the missed fares was the result of passengers boarding at both front and rear. Even when the motorman used the bell cord to signal the number of passengers boarding at the front, passengers quite regularly got "lost." Solely because of the loss in receipts, he determined to establish a "leave by the front door" practice; nor was he content with anything but the complete establishment of the rule. He educated the public to the knowledge that the front door could not be used as an entrance. The result of his work were soon apparent not only in fare receipts but in decreased accidents, because accidents occurring while passengers were alighting were practically eliminated. And when the Pay-As-You-Enter cars were placed in service there were no operating delays due to the public's unfamiliarity with the necessity for boarding at the rear.

THE J. G. BRILL COMPANY

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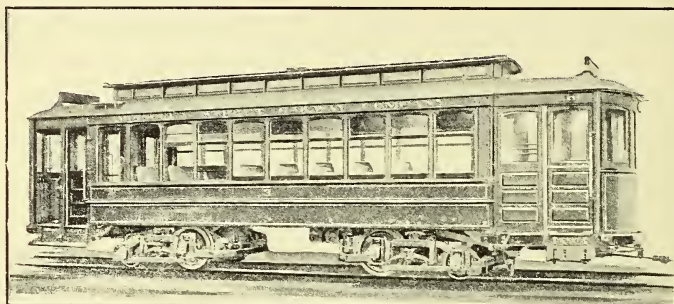
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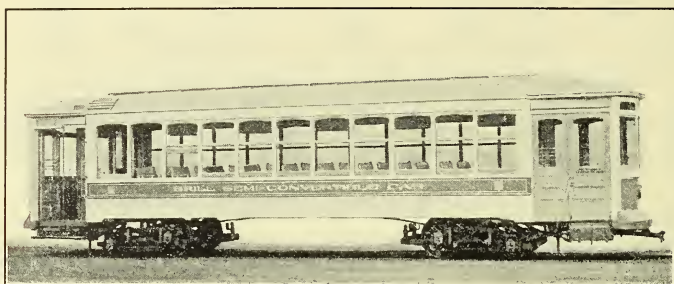
BRILL SEMI-CONVERTIBLE CAR ON No. 39-E SINGLE MOTOR TRUCKS

Many roads in the smaller cities which have used single truck cars are finding that, with the adoption of prepayment equipment, it is wise to adopt Single-Motor Trucks also. The cost of operation is practically the same and the larger cars are favored by the public and provide for growth. Prepayment cars on Brill No. 39-E trucks, if the cars embody the Brill Semi-Convertible Window Arrangement, are thoroughly modern cars for all-the-year-around service. The window arrangement increases the interior width, does away with unsanitary wall pockets which are a continual nuisance and source of maintenance expense, and provides a bright, light car.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA

BRILL MAGAZINE

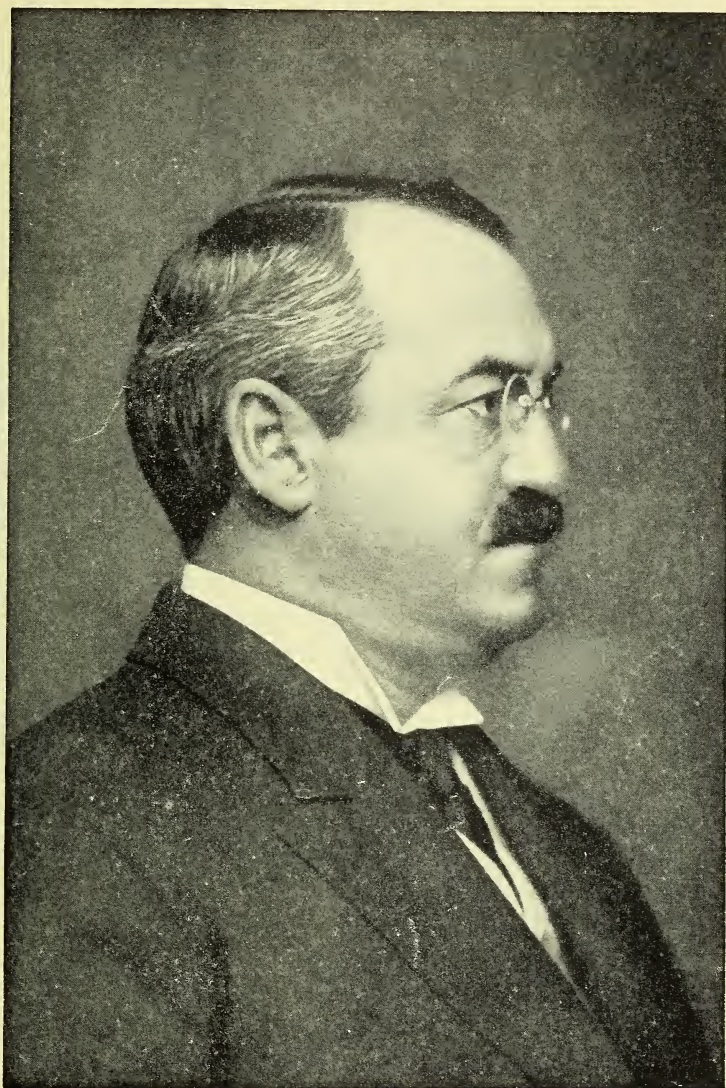




BRILL PLAIN ARCH ROOF CAR

We have said a good deal about cutting down weight by using the Brill Plain Arch Roof and its providing a much stronger roof than possible in the monitor form. We have talked about the increased head room, the advantages in connection with ventilating systems, the higher windows that can be used and the improvement in the window arrangement especially with the Brill semi-convertible system. But we have not as yet put one word in print about the Brill Plain Arch Roof being absolutely moisture proof. No matter how well a monitor roof is constructed it has joints that under unusually heavy stresses are liable to come apart enough to let in moisture. The Brill Plain Arch Roof is covered with canvas made in a single piece without seams and is therefore absolutely water proof.

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



C. G. Hooker



BRILL MAGAZINE

Vol. IV

NOVEMBER, 1910

No. 11

CALVIN G. GOODRICH

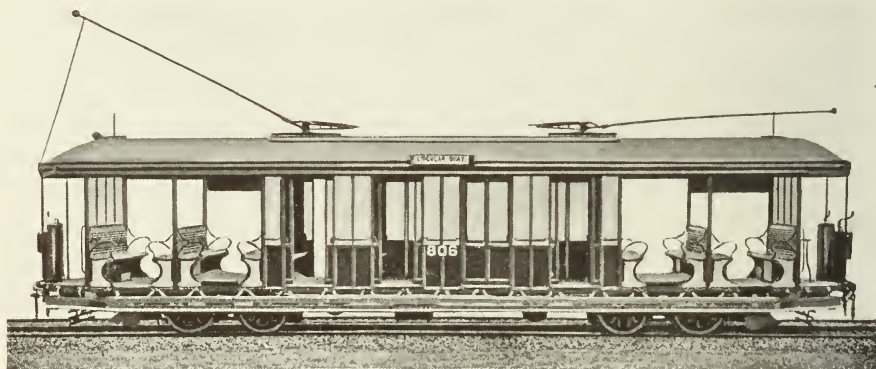
[WITH PORTRAIT INSERT]

CALVIN G. GOODRICH, President of the Twin City Rapid Transit Company and the Duluth-Superior Traction Company, was born in Oxford, Ohio, March 12, 1856, and in 1868, with his father, moved to Minneapolis. Mr. Goodrich has the unusual record of having been connected with one road during his entire electric railway career in which he has held practically every position from bookkeeper to president, and to him is largely due the present high standard to which these two companies have attained. In 1887 he entered the employ of the Minneapolis Street Railway Company as bookkeeper. One year later he was elected secretary of the company and in 1888 became a director. He was appointed superintendent in 1883 and shortly afterwards general manager in which capacity he served until 1886, when he was elected vice-president and general manager and resigned as secretary. In 1891 the Minneapolis Street Railway Company, the St. Paul City Railway Company and the Minneapolis & St. Paul Suburban Railway Company were merged through the formation of the Twin City Rapid Transit Company and Mr. Goodrich became vice-president and general manager of that company; later he was elected managing director. On March 16, 1909, after the death of Mr. Thomas Lowry, he was elected president of the Twin City Rapid Transit Company. Mr. Goodrich was elected president of the American Street & Interurban Railway Association in 1907. The two companies of which Mr. Goodrich is president have a total capitalization of \$50,403,000 and own all the traction properties of Minneapolis, St. Paul, Duluth and Superior, aggregating over 450 miles of track. They also own two large parks and operate a number of fast steamboats and three double-end ferry boats on Lake Minnetonka.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

SYDNEY, AUSTRALIA*

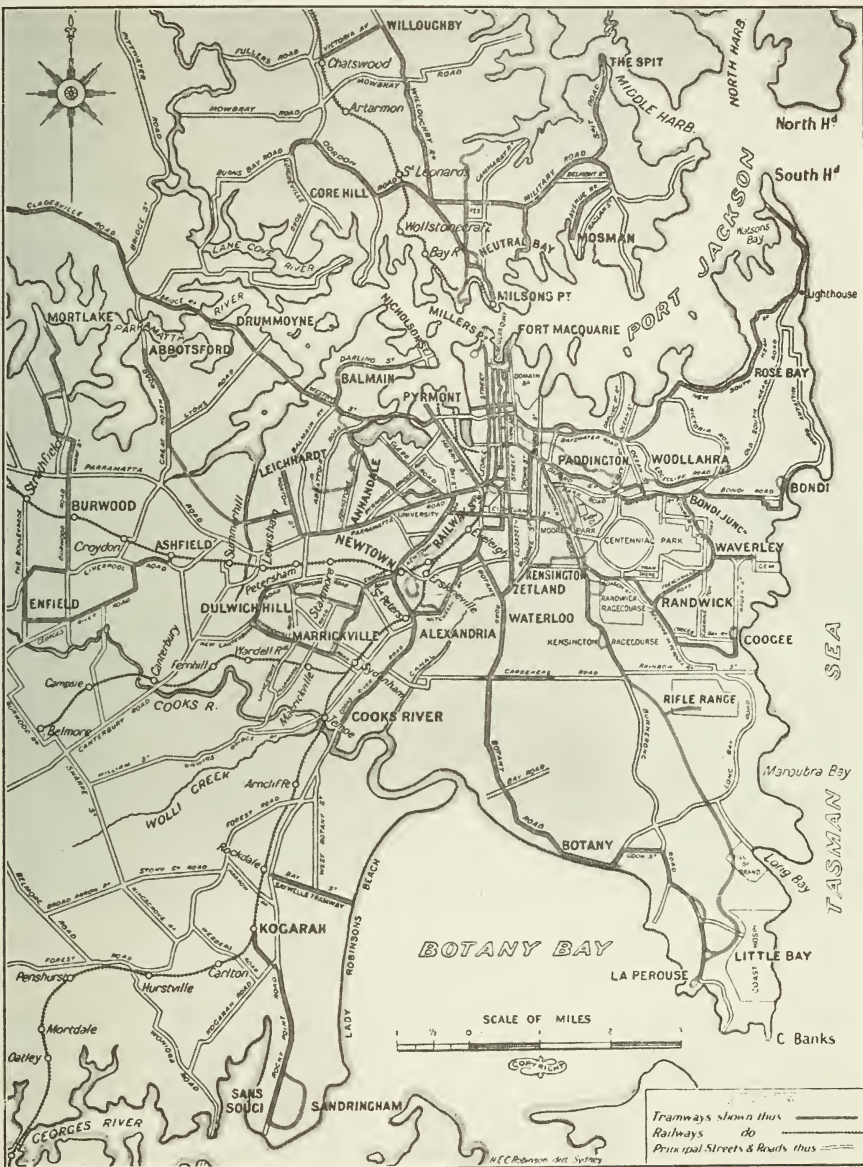
SYDNEY, the capital and metropolis of New South Wales, is situated on the southeastern coast of Australia. It ranks fourth amongst British ports in value of trade and is second only to London in taxable property. The city proper is on the southern side of one of the finest harbors in the world and is connected by numerous ferries with North Sydney and other sections on



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Climatic Conditions in Sydney demand a Car of this Type with both Open and Closed Compartment—The Car is 44 ft. 4 in. Long and has a Seating Capacity of 80 Passengers

the harbor and by electric and steam tram lines with the suburbs on the landward sides. Trunk lines extend up and down the coast and to the principal cities in the interior of the state, coasting steamers operate on regular schedules to points on the eastern and southern coasts of the Continent and five lines of European steamers and two of American furnish the foreign communication. The population is 600,000 in round numbers, showing a growth of about 100,000 in the

* This is the twenty-third article of this series. The former articles have had as their subjects the style of car used in the following cities: Philadelphia, New York, Detroit, Chicago, Baltimore, London, Washington, New Orleans, Boston, Denver, Atlanta, Portland (Ore.), Norfolk, Lisbon, Milan, Moscow, Winnipeg, Glasgow, Tokyo, Brussels, Cleveland and Richmond.



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Sydney Has a Population of 600,000—The Railway System is Owned by the State Government—184 Miles of Track are Electrically Operated and 1000 Cars in Service

last ten years. The climate is mild, the mean temperature in summer being 71° Fahr. and winter 54° ; the extremes recorded during a long period are 36° and 108° ; average annual rainfall 49 inches.

It will be seen from the map of the city and surroundings that the railway lines converge in four streets extending north and south about a mile between Circular Quay and the Central Railway Station. This



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Circular Quay From Which Ferries and River Steamers Ply Between Many Points on the Harbor and River

is the old part of the city and is the commercial and governmental section. A view on one of these streets will be seen on the cover of this issue, showing the general post office and in the distance the dome of the Queen Victoria Market, a fine structure which occupies an entire square. The state and municipal government buildings, the hotels, churches and theatres which line these streets bring into this section their daily quota of passengers from the surrounding parts and suburbs and together with the fact that this is the commercial and

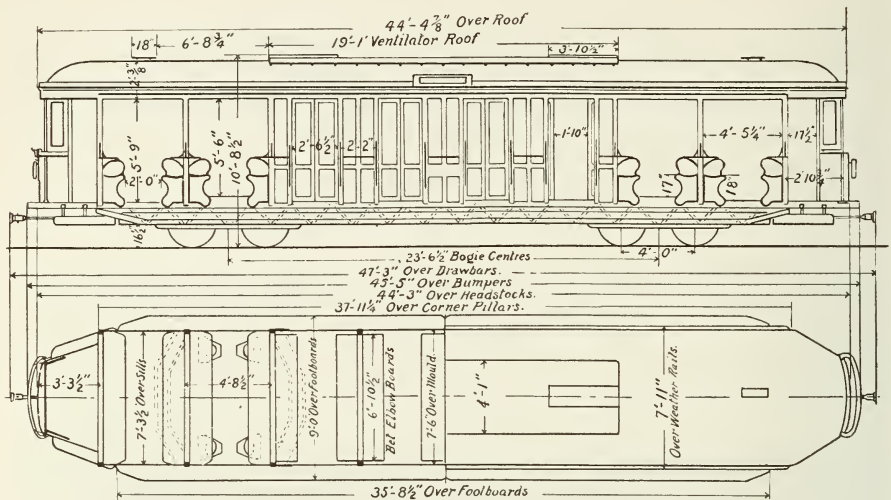
manufacturing district with its shops, warehouses, office buildings, banks and factories, and besides must be partly or wholly traversed by nearly all who enter or leave the city by water, rail or street, makes it necessary to take advantage of every means that will aid in securing the adequate transportation facilities demanded by the conditions.

The electric lines extend into the suburbs in every direction, con-



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Transfer Station and Waiting Room at the Southern End of George Street—The Business District Occupies Four Parallel Streets Extending for a Mile Between This Point and Circular Quay

necting all the districts within the municipality and in most cases connecting these districts with each other. The arrangement of the lines is exceedingly interesting in its direct and comprehensive scheme. It will be noted that loops are provided at a number of the terminals and at half-way points on the longer lines and evidently they will be ultimately installed on every line to enable all cars to be operated from one end. Steam tram lines serve the more distant suburbs by connecting them with points on the several trunk lines which run into the



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Side Elevation Shows the Latticed Girder Construction of the Side Sills—The Flooring Over the Trucks Is Raised 3 Inches to Reduce the Step Heights

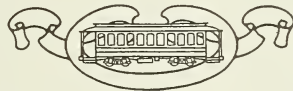
Central Station. Before long these short steam lines will be connected with the lines of the city and suburban system and be electrified.

The lines are owned by the State Government and are under the control of the Railway Commissioners. They have a total trackage of 282 miles, 184 of which is electrically operated. The electric rolling stock consists of 892 motor cars, 81 trail cars and 28 service cars; 80 of the cars, and the trucks under 472 cars, were built by The J. G. Brill Company. The majority of the cars are of the combination open and closed type illustrated, which is admirably adapted to the climatic conditions as the mild winters permit the use of open cars throughout the year. Individually operated sliding doors are arranged to occupy the least space possible between the seat ends and posts of the closed compartment. The cars seat 80 passengers, and, as will be seen from the floor plan, no special provision is made for standing passengers. Weight of car body, 12,300 lbs.; weight of motors, electrical equipment, brakes, etc., 12,775 lbs.; weight of trucks, 7,950 lbs.; total weight, 33,025 lbs.; weight per seated passenger, 414 lbs.

The underframe is of all-steel construction with latticed girder sills. A reduction of three inches in the height of the main part of the car floor is secured by raising the floor that amount over the

trucks. The upper structure is lightly but substantially built, the roof being of the plain arch type. The cars are equipped with four 30 h. p. motors, multiple control and air brakes. Other details may be obtained from the diagrams.

The fares charged average 0.61 d. per mile, the lines being divided into penny sections of about $1\frac{3}{4}$ miles. For the metropolitan area the average length of the sections is about $1\frac{1}{2}$ miles and the fare 0.55 d. per mile. For eighteen out of the last twenty years the tramways have earned more than the cost of working and interest. The State does not set apart any portion of the earnings for renewals which may hereafter prove a considerable item as a large part of the rolling stock is new. The capital expenditure for the electric lines at June 30, 1909, £3,756,198; the passengers carried for the year, 173,733,133; gross revenue, £1,009,498; working expenses, £785,404; interest on capital, £125,603; profit, £98,491.



PAY-AS-YOU-ENTER CARS FOR THE NORTHERN TEXAS TRACTION COMPANY

BRILL PLAIN ARCH ROOF

IN the March, 1910, number of BRILL MAGAZINE a description was given of some full vestibuled single-end interurban cars for the Northern Texas Traction Company built by The G. C. Kuhlman Car Company. In addition to those cars the American Car Company recently delivered to them 15 straight side double-truck closed Pay-As-You-Enter cars.

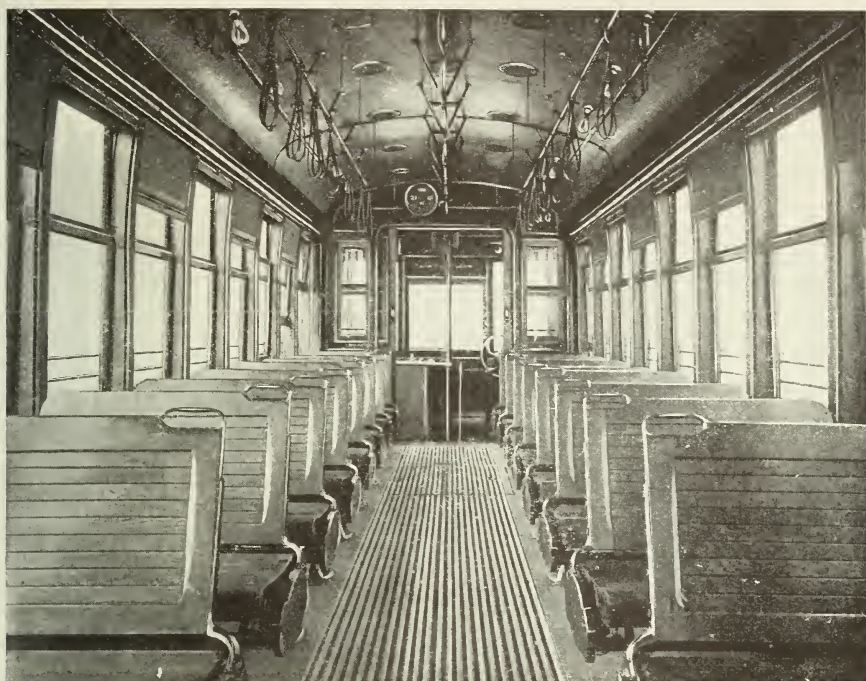
The platforms are entirely enclosed with sheet steel panels and folding and sliding doors. On the right hand side of the platform the wide opening is divided by a post into exit and entrance passageways which are closed with folding doors. An iron pipe stanchion in the centre of the platform supports the inner end of a pipe partition

rail which on the front platform is swung around to the left of the motorman and fitted into a socket on the inside of the dasher and serves to keep standing passengers on the left side of the forward platform out of the way of the motorman and of passengers leaving the car from the front exit. The bulkhead doors are double sliding doors and are arranged so that they can be individually locked by the conductor. The front exit door slides back into a pocket and is controlled by a lever operated by the motorman. The step folds automatically in conjunction with the operation of the door.

The side sills are $4\frac{1}{2}$ by $7\frac{3}{4}$ -in. yellow pine plated on the outside with $\frac{3}{16}$ by 15-in. steel plate, extending the full length of the car. The cross sills are of oak $2\frac{3}{4}$ by 5 in. and the end sills oak $4\frac{1}{2}$ by $7\frac{3}{4}$ in. reinforced on the inside with a $\frac{1}{4}$ by 5 in. steel plate its full length and with a 6-in. foot at each end. The side panels are of No. 14 gauge sheet steel sheathing. These cars have a seating capacity of 40 passengers. The seats are arranged with 8 reversible cross seats on each side of the car placed against the sheathing between the side posts and two stationary longitudinal seats. There are ten windows on each side of car arranged with top sash stationary and the bottom to raise into shallow roof pocket, the arrangement being similar to the Brill semi-convertible window system except that the upper sash is stationary. The interior of the car is finished throughout in mahogany except from the truss plank to the window sill which is of sheet



PAY-AS-YOU-ENTER CARS FOR THE NORTHERN TEXAS TRACTION COMPANY—The Sides Including the Vestibule Are Sheathed With Steel—The Cars Are Mounted on Brill No. 39-E Trucks.



PAY-AS-YOU-ENTER CARS FOR THE NORTHERN TEXAS TRACTION COMPANY—The Extra Height Permitted to the Windows by this Roof is a Distinct Advantage

steel painted to conform to the interior finish.

From the figures given below it will be seen that these cars have been built almost as lightly as possible consistent with strength. This result is not only obtained in the general construction of the car but especially in the Plain Arch Roof. By mounting the cars on Brill No. 39-E trucks a large saving is also made as the truck itself is lighter than a double-motor truck and only two motors are required to furnish the traction power.

Length of body	26 ft. 0 in.	Weight of body less electrical	
Length over platforms	39 ft. 0 in.	equipment (approx.)	14,796 lb.
Length of platforms	6 ft. 6 in.	Weight of air brake equip-	
Width over sills	8 ft. 9 in.	ment (approx.)	1,500 lb.
From floor to headlining	8 ft. 0 in.	Weight of trucks	9,600 lb.
From step to platform	14 in.	Weight of motors	7,104 lb.
Type of trucks	Brill 39-E		
Motors	G. E. 219. 2-50 h. p.	Total weight	33,000 lb.

NEW ROLLING STOCK FOR THE BOSTON & MAINE RAILROAD

SMOKING AND BAGGAGE CARS

THE Boston & Maine, which has recently been the subject of considerable attention in the railway and daily press because of the retirement of Mr. Lucius Tuttle as president and the election of President Mellen of the New York, New Haven & Hartford to succeed him, is receiving 20 combination smoking and baggage cars built by the Wason Manufacturing Com-



NEW ROLLING STOCK FOR THE BOSTON & MAINE RAILROAD—20 of These 61-ft. Cars Have Recently Been Furnished by the Wason Manufacturing Company

pany. Two of the cars have one platform vestibuled like the car shown in the accompanying engraving and the balance are open platform cars. Each car is 61 ft. long over end sills and weighs complete with trucks 96,000 lbs.

The underframing of the cars is standard on the Boston & Maine. The side sills are 5 by $8\frac{1}{2}$ in.; the center sills 5 by $7\frac{5}{8}$ in. and 5 by $3\frac{5}{8}$ in. and the two intermediate sills 4 by $7\frac{5}{8}$ in. There are also included in the underframe two 12-in. (40 lb. per ft.) I-beams which are spaced 16-in. centers extending through the car from platform to platform. The platforms and bolsters are a patented cast steel type. The truss plank is $2\frac{1}{2}$ by $11\frac{5}{8}$ in. yellow pine in one length and extends from one end of the car to within 4 ft. 6 in. of the side sill door opening. There is an inverted iron truss 2 by $\frac{1}{2}$ in. The end sills

are white oak in two pieces, the inside piece being 4 by 8½ in. in size. The side sill tierods are ⅝-in. diameter with ¾-in. drop forged turn-buckles at the centers. The single window braces, corner and vestibule door posts are white oak. The end door posts are mahogany.

The interior finish of the smoking compartment is Mexican mahogany and the same wood is used for the vestibules. A line of mar-



NEW ROLLING STOCK FOR THE BOSTON AND MAINE RAILROAD—The Interior Finish of the Smoking Compartment is Mexican Mahogany with Plain Line Marquetry—The Ceilings are Composition and the Seats Upholstered in Pantasote

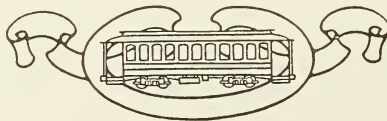
quetry is placed in all panels and door casings and figured mahogany veneers are used for the large panels. The seats are upholstered in pantasote and the curtains are made from pantasote. There is a saloon with dry hopper. The car is lighted with Pintsch gas.

The baggage compartment is finished in matched North Carolina pine with the upper deck sheathed with whitewood. There are two closets, one for the conductor and one for the baggage master at the



NEW ROLLING STOCK FOR THE BOSTON AND MAINE RAILROAD—The Baggage Compartment is Finished in North Carolina Pine and has Two Wardrobe Closets for the Use of the Baggage Master and the Conductor

platform end of the baggage compartment. Each closet has a shelf and drawer and several wardrobe hooks. There is also a baggage master's shelf hinged to the side of the car. The trimmings throughout the cars are oxidized bronze.



CARS FOR THE TRENTON, NEW JERSEY, STREET RAILWAY

PAY-AS-YOU-ENTER EQUIPMENT

THE Trenton Street Railway Company has recently added ten 28-ft closed and full vestibuled Pay-As-You-Enter cars to its equipment. The cars have longitudinal seats, are mounted on Brill No. 39-E trucks, and were built by The J. G. Brill Company. The Pay-As-You-Enter platforms are 5 ft. 10 in. long and as the cars are of the double-end type each platform has



CARS FOR THE TRENTON STREET RAILWAY—These Ten 28-ft. P. A. Y. E. Cars are the First of the Type Ordered for the Trenton Lines

a single sliding exit door on one side and two-section folding doors on the other. The folding doors are hung on three heavy drop forged hinges and the top of the outside door when open is held by a stop fastened to the under side of the platform hood. The stop is so designed that when the doors are folded open the inner face of the stop holds the inner door and the spring catch fastened to the stop engages the out door.

The sliding exit door on the brake staff side of the platform has a hinged window of the same type as used on the Lehigh Valley cars for easy access to the door mechanism and for cleaning the outside window. This door is provided with a handle on the inside only and has a pedal device which is operated by the motorman to open and close the door.

The exit step operates in conjunction with the door in such a manner as to fold the step up when the door is closed and the lower step before the opening of the door exceeds twelve inches. The exit and entrance doors in the bulkheads are both the sliding type.

The side sills of the cars are $4\frac{3}{4}$ by $6\frac{3}{4}$ in. in size and are plated with 15 by $\frac{3}{8}$ -in. steel plate. The end sills, diagonals and also the cross



CARS FOR THE TRENTON STREET RAILWAY—The Seating Capacity is 38.—The Upper Sashes Are Stationary and Lower Drop Into Covered Pockets

sills are white oak, in size respectively $5\frac{1}{4}$ by $6\frac{7}{8}$ in. and $3\frac{1}{2}$ by $5\frac{7}{8}$ in.

The seating capacity of each car is 38 persons. The windows are the drop-sash type. The interior finish of the cars is ash with birch veneer ceilings. The seats are upholstered in rattan and the curtains are made of pantasote.

The cars are mounted on Brill No. 39-E single-motor trucks with 33-in. rolled steel driving wheels and 21-in. pony wheels. The trucks

have a wheel base of 4 ft. and will be operated over 5 ft. 2 in. gauge track which has curves with not sharper than 45-ft. radius. Each truck carries a 65 h. p. interpole motor.

The principal dimensions of the cars are as follows:

Length of body	28 ft. 0 in.	From tread to platform . . .	1 ft. 1 in.
Length over vestibules . .	39 ft. 8 in.	From platform to floor . . .	8 $\frac{3}{4}$ in.
Length of each vestibule . .	5 ft. 10 in.	Seating capacity	38
Centers of side posts . . .	2 ft. 8 in.	Type of trucks	Brill No. 39-E
Width over sills	7 ft. 7 in.	Motors	G. E. 210—2-65
Width over posts	7 ft. 9 $\frac{1}{2}$ in.	Weight of car body less	
Extreme width	8 ft. 1 in.	electric equipment	15,140 lb.
From sills over trolley		Weight electrical equipment	1,233 lb.
boards	9 ft. 3 $\frac{1}{2}$ in.	Weight of trucks	10,720 lb.
From track to sills	2 ft. 9 $\frac{3}{8}$ in.	Weight of motors	6,740 lb.
From floor to headlining . .	8 ft. 3 $\frac{1}{2}$ in.		
From track to step tread . .	1 ft. 5 $\frac{3}{8}$ in.	Total weight	33,833 lb.



PASSENGER COACHES FOR PORTO RICO STEEL UNDERFRAME

IN the January, 1910, number of BRILL MAGAZINE a description was given of passenger cars for the American Railroad of Porto Rico. With the exception of some slight differences in the underframe and seating arrangement and an extra saloon the cars furnished the Fajardo Development Company are of the same construction as those already described.

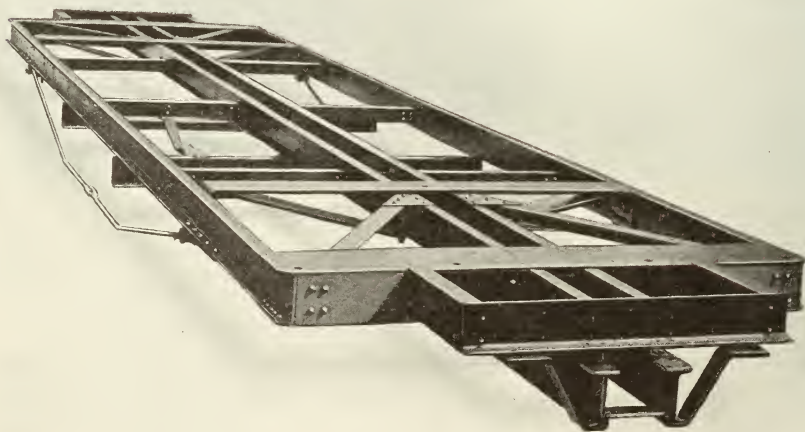
The town of Fajardo is situated in the most eastern part of Porto Rico on the Fajardo River a few miles in from the coast and has railway connections with the lines encircling the island.

The Fajardo Development Company's car has a saloon at diagonal corners. There are 10 reversible seats, one seat against the saloon and one longitudinal seat on each side of the car making a total seating capacity of 46 passengers. The seats are the Brill "Winner" type, upholstered in rattan and with oak end panels and arm rests. The

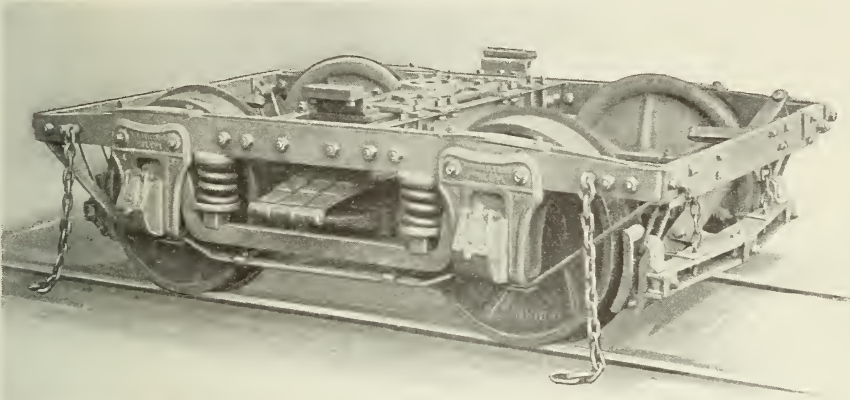


PASSENGER COACHES FOR PORTO RICO—This is a Typical Car for Steam Railway Use in the Tropics—
The Outside Panels are of $\frac{5}{8}$ -in. Mahogany Varnished but not Painted Giving
the Car a Very Rich Appearance

upper window sashes are stationary and the lower arranged to raise. The sashes as well as the double blinds, arranged to raise, are of oak. The interior of the car is finished in quartered oak with oak veneer ceilings. All the trimmings are nickel plated including the continuous basket racks. The outside sheathing is of $\frac{5}{8}$ -in. mahogany, varnished but not painted, which gives the exterior of the car a very rich finish. The all-steel underframe is composed of 8-in. channels. The majority



PASSENGER COACHES FOR PORTO RICO—All-steel Underframe Constructed of 8 in. Channels with
Riveted Connections of Crossing and Braces



PASSENGER COACHES FOR PORTO RICO—All-steel M. C. B. Truck, 4 ft. 6 in. Wheel Base; 1 Metre Track Gage

of cars now built for tropical countries are provided with steel underframes as those of wood are subject to the ravages of white ants and other insects and the long rainy season has a serious effect on wooden supporting members. The crossings are secured to the side frames with forged corner brackets and a steel plate is riveted to both the top and bottom of the end sill for its entire length.

The cars are mounted on all-steel M. C. B. trucks having the following dimensions:

Diameter of wheels . . . 28 in. cast iron	Journals 3½ in. by 6 in.
Tread 5 in.	Length of axle 5 ft. 4 in.
Flange 1½ in.	Wheel base 4 ft. 6 in.
Diameter of axles 4½ in.	Track gage 3 ft. 3⅜ in.

Following are the principal dimensions of the car described:

Length of body . . . 35 ft. 0 in.	From sills over trolley boards 9 ft. 8½ in.
Length over platforms . 40 ft. 4 in.	From floor to headlining 8 ft. 7 in.
Length of front platform 2 ft. 8 in.	From track to step tread 25 in.
Length of rear platform 2 ft. 8 in.	From step tread to platform 16 in.
Centers of side posts . . 2 ft. 6 in.	Seating capacity 46
Width over sills . . . 8 ft. 6 in.	Weight of car body 21,990 lb.
Extreme width . . . 8 ft. 9 in.	Weight of trucks 11,600 lb.
From track to sills . . . 2 ft. 6⅞ in.	
From track to center coupler . 26 in.	Total weight 33,590 lb.

FLAT CARS FOR THE FERRO CARRIL DE XUCHEL

ESPERANZA, MEXICO

IN August, The J. G. Brill Company shipped to its agents in the City of Mexico, the International Machinery and Engineering Company, ten flat cars shown in the accompanying engraving for delivery to the Ferro Carril de Xuchel, Esperanza, Mexico, for steam railway use. The cars are constructed throughout of the best grade of yellow pine, with the exception of the end sills which are of oak.

The side sills are $3\frac{1}{2} \times 7\frac{1}{2}$ in. and the stringers are $3\frac{1}{2} \times 6\frac{3}{4}$ in., both of yellow pine, and the end sills are $6\frac{3}{4} \times 6\frac{3}{4}$ in. oak. The floor is $1\frac{3}{4}$ in. yellow pine. The cars are equipped with M. C. B. standard couplers and have a single brake wheel, operating the brakes on both trucks. They are mounted on Brill No. 55-D Iron Freight Trucks, having a track gage of 4 ft. $8\frac{1}{2}$ in. and a wheel base of 4 ft. 6 in. The wheels are 24 in. cast iron.

Esperanza is in the State of Puebla and lies about 125 miles east of the City of Mexico or just about midway between the City of Mexico and Vera Cruz. This section of Mexico is devoted mainly to agricultural pursuits, sugar cane and hemp being the principal products.

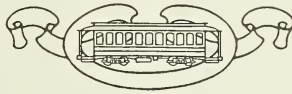


FLAT CARS FOR THE FERRO CARROL DE XUCHEL—The Cars are 30 ft. long and will be used for the Transportation of Cane and Hemp and other Agricultural Products

The cars will be used in the transportation of these products as well as for other general freighting purposes.

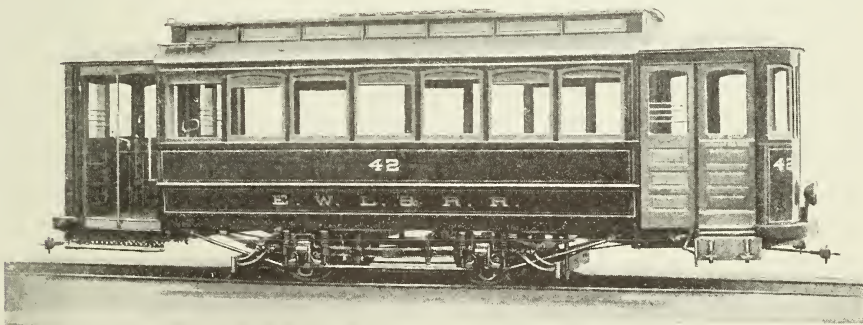
In making shipment of these cars, the principal dimensions of which are given, it was found most expedient to choose a water route, so the cars were accordingly knocked down and crated.

Length	30 ft. 0 in.	Weight complete	14,000 lb.
Width over sills	8 ft. 6 in.	Capacity	26,000 lb.

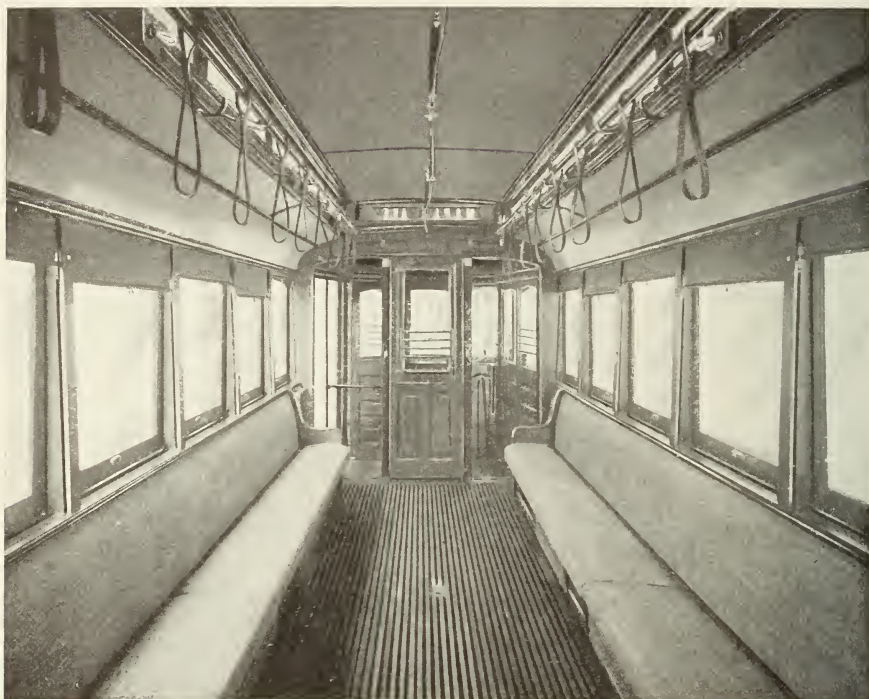


SINGLE-TRUCK PAY-AS-YOU-ENTER CARS FOR ELMIRA

AMONG the cities which have recently added prepayment cars to their equipment is Elmira, N. Y. At the beginning of the present year the Elmira Water, Light & Railroad Company was operating in the neighborhood of 100 cars, most of which were built by the Brill plants, and owned and leased a little over 27 miles of track. This includes the track and equipment of the Elmira and Seneca Lake Traction Company which



SINGLE-TRUCK PAY-AS-YOU-ENTER CARS FOR ELMIRA—This May Be Regarded as a Standard Type of Longitudinally Seated Single-Truck Pay-As-You-Enter Car



SINGLE-TRUCK PAY-AS-YOU-ENTER CARS FOR ELMIRA—The Seats Accommodate 28 Passengers—
There Are Single Folding Seats at Diagonally Opposite Corners of the Car
One of Which is Always Available

extends from Elmira to Watkins, on Seneca Lake, passing a number of towns and villages, and reaches Watkins Glen, one of the most picturesque parks in the United States.

The J. G. Brill Company recently delivered to the Elmira Water, Light & Railroad Company six single-truck closed Pay-As-You-Enter cars. These cars have longitudinal seats, under which there are six electric heaters, and single window sashes which are arranged to drop into the side walls of the car. The inside finish is cherry with bronze trimmings. The vestibules are each 5 ft. 10 in. long, of the stationary round-end style and fitted with the usual prepayment equipment. At the rear of the car, which has both entrance and exit, there are double swing doors and at the exit at the front end of the car there is a single sliding door. The step at this end folds up when the exit is closed.

The side sills are $3\frac{3}{4}$ by $5\frac{1}{4}$ -in. yellow pine plated with $\frac{5}{8}$ by 8-in.

steel plate on the outside. The end sills are of $4\frac{1}{2}$ by $5\frac{1}{2}$ -in. yellow pine and the center joists are $3\frac{1}{2}$ by $3\frac{1}{2}$ white oak. The cars are mounted on Brill No. 21-E trucks having a wheel base of 7 ft. 6 in. and 33-in. cast iron wheels.

Length of body . . . 20 ft.	From step to platform . . . 14 in.
Length over vestibules . 31 ft. 8 in.	From platform to floor . . . 6 in.
Length of each vestibule . 5 ft. 10 in.	Seating capacity 28
Centers of side posts . . 2 ft. 9 in.	Type of trucks . . . Brill No. 21-E
Width over sills . . . 7 ft.	Motors . . . G. E. 78. 2-35 h. p.
Width over posts . . . 8 ft.	Weight car body less electric equipment 11,440 lb.
Extreme width . . . 8 ft. $3\frac{1}{4}$ in.	Weight electric equipment . . . 960 lb.
From track to under side of side sills 32 $\frac{1}{4}$ in.	Weight of trucks 5,400 lb.
From sills over trolley boards 8 ft. $6\frac{3}{4}$ in.	Weight of motors 5,120 lb.
From floor to headlining . 7 ft. $10\frac{3}{8}$ in.	Total weight . . . 22,920 lb.
From track to step tread . 15 $\frac{3}{4}$ in.	



SEMI-CONVERTIBLE CARS FOR BANGOR, MAINE

No. 27-M. C. B. HIGH SPEED TRUCKS

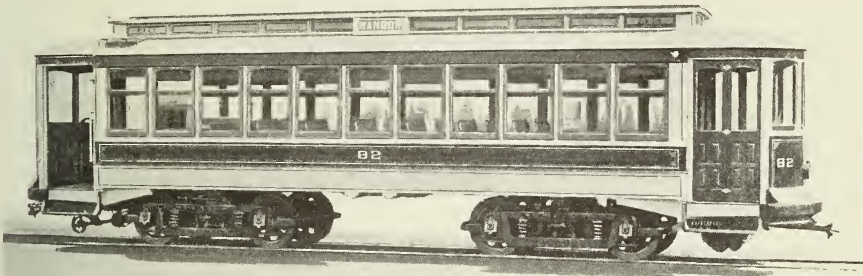
THE Bangor Railway & Electric Company recently received two semi-convertible cars from The J. G. Brill Company for use on the suburban portion of its lines. This company serves a population of about 45,000 and owns over 60 miles of track. In their last annual report they show a total of 5,242,645 fare passengers and 5,709,128 transfer passengers carried. Their equipment is composed almost exclusively of Brill cars and trucks. An article on cars and trucks supplied this company was published in BRILL MAGAZINE of April, 1907, giving description of the power station at Vezie. The new cars are of the same type as those described in the article referred to, being the Brill semi-convertible, but differing in the platform arrangement. The company finds it

satisfactory and economical to use what is practically a city type of body on interurban trucks as its interurban conditions call for a frequent service with many stops. The choice of the semi-convertible car was made largely on account of the heavy summer traffic, as Bangor is an important center for tourists and during the summer season the cars are taxed to their full capacity. By using drop platforms and a judi-



SEMI-CONVERTIBLE CARS FOR BANGOR, MAINE—The Seats Being Placed Against the Lining between the Posts gives a Maximum Aisle Width, an Important Factor in Cars Where the Stops Are Frequent

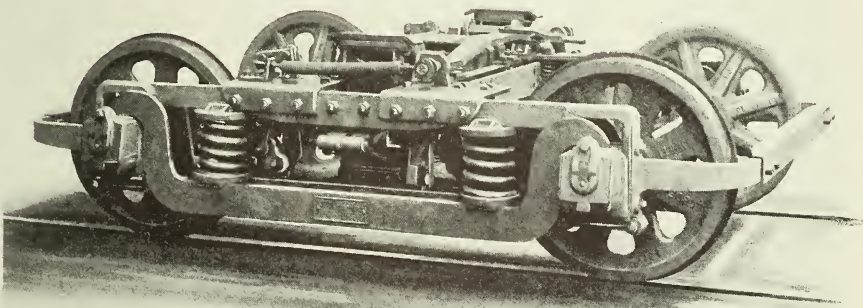
cious distribution of step heights the platform steps are low enough for entrance from the roadway even though the cars are mounted on interurban trucks. The bottom framing is of the standard design used in this type of car and includes a 15-in. steel plate on the inside of the wooden sill, which takes the place of upper and lower trusses and in fact furnishes a better support at the center and ends than possible with trusses and at the same time adds additional stiffness to the side posts



SEMI-CONVERTIBLE CARS FOR BANGOR, MAINE—On Account of the Frequent Service and many Stops What is Practically a City Type of Car Has Been Found Most Satisfactory and Economical

to which it is secured. The seat ends are secured to the sills between the posts directly over the sill plates and as they are thus permitted to come between the posts an additional width is permitted for the interior of the car as follows: Thickness of car wall on each side 2 in.; the seats are 36-in. long, leaving an aisle width of 24 in. in a car 8 ft. 4 in. wide over the posts. Leaving out the upper trusses besides leaving room for the seats to be brought to the wall panels enables the window sills to be made $24\frac{5}{8}$ in. from the floor, giving an extra high window opening.

The trucks are of the Brill 27-M. C. B. type similar to those fur-



SEMI-CONVERTIBLE CARS FOR BANGOR, MAINE—The Cars are Mounted on Brill No. 27-M. C. B. 1 Trucks which Have Proved Their Easy Running Qualities under Light Cars at all Speeds up to 50 miles an hour

nished to the Public Service Corporation of Newark and for a similar class of service. With its solid forged side frames it is a staunch truck for its weight and has proved its easy riding qualities under light cars at all speeds up to 50 miles an hour. It has a maximum load capacity on center plates of 46,000 lb. The wheel base is 6 ft. and the axles are A. S. I. R. A. standard, $3\frac{3}{4}$ in. by 7 in. journals; 33-in. steel tired wheels are used and the brake hangers are the half-ball type fitted with A. S. I. R. A. standard shoes. The motor equipment consists of four G. E. 80 type motors.

Length of body	30 ft. 8 in.	From platform to floor	$8\frac{1}{8}$ in.
Length over vestibules . .	40 ft. 1 in.	Seating capacity	44
Length of each vestibule .	4 ft. $8\frac{1}{2}$ in.	Type of trucks Brill No. 27-M. C. B. 1.	
Centers of side posts . . .	2 ft. 8 in.	Motors	G. E. 80. 4-40 h. p.
Width over sills	8 ft. $1\frac{1}{2}$ in.	Weight car body less elec-	
Width over posts	8 ft. 4 in.	tric equipment	17,100 lb.
Extreme width	8 ft. $5\frac{3}{4}$ in.	Weight electric equipment	1,550 lb.
From sills over trolley		Weight of trucks	17,200 lb.
boards	8 ft. $11\frac{3}{8}$ in.	Weight of motors	11,200 lb.
From track to sills	2 ft. $11\frac{1}{2}$ in.	Weight of brake equipment	
From floor to headlining	8 ft. $\frac{7}{8}$ in.	(approx.)	1,600 lb.
From track to step tread	1 ft. $7\frac{1}{2}$ in.	Total weight	48,650 lb.
From tread to platform	1 ft. $2\frac{1}{2}$ in.		



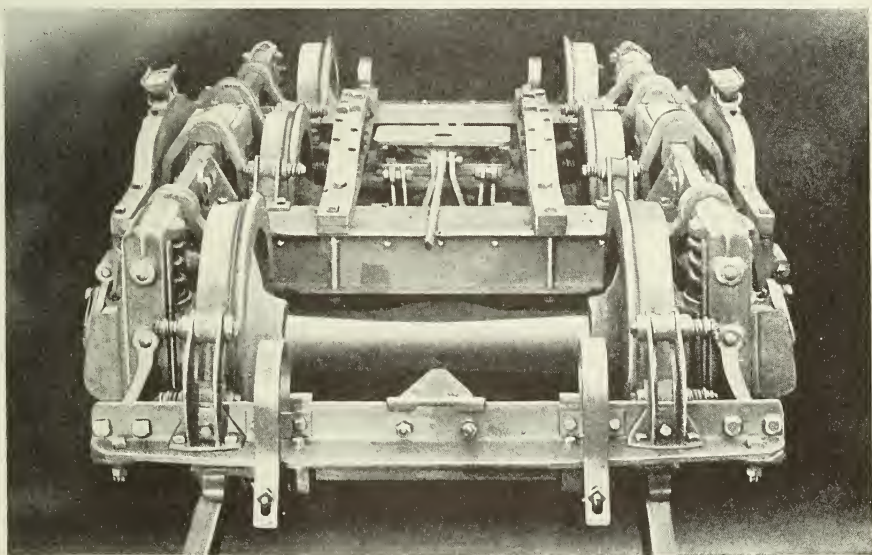
SIX-WHEEL TRUCKS FOR PRESIDENTIAL TRAIN

CENTRAL NORTHERN RAILWAY OF ARGENTINA

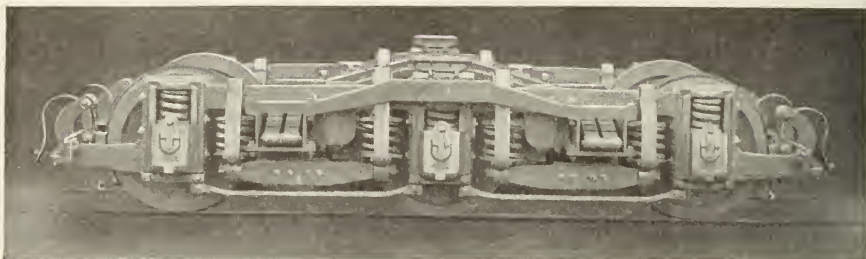
A fine train of four cars known as the Presidential Train was completed in time to be exhibited at the Argentina Centennial Exhibition and was mounted on six-wheel trucks of an interesting design. Brill No. 27-E2 four-wheel trucks have been in service on the Ferro Carril Central Norte for several years and it was desired to have the six-wheel trucks for this

special train of the same type. All the features of the No. 27 type are incorporated, the spring-link suspended equalizing bars, journal springs, solid forged side frames and other frame members. The brake system is simply and effectively arranged and includes Half-Ball brake hangers on the outside hung shoes and the shoes on each side of the center wheels. The long spring base secured by this design and the three sets of springs—double elliptic bolster springs, the springs in the swinging links and the journal springs—provide complete equalization, cushion the side motion and insure easy riding qualities at all speeds. The side frames or wheel pieces are excellent examples of the solid forging process and its unlimited possibilities in relation to truck designing. The length of these side frames is 11 ft. 1 in. The trucks were built for 1 meter (3 ft. 3 $\frac{3}{8}$ in.) track gage and have a total width of 6 ft. 5 in. Axle centers 4 ft. 6 in.; diameter of wheels, 30 in.; journals 4 $\frac{1}{4}$ in. by 8 in. Load on each center plate 50,000 lbs.

The Ferro Carril Central Norte is a part of the railway system, about 2000 miles in length, operated by the Argentina Government



SIX-WHEEL TRUCKS FOR ARGENTINE—The Trucks Were Built for One-Meter Gage Track—Load On Each Center Plate 50,000 Lbs.



SIX-WHEEL TRUCKS FOR ARGENTINE—The No. 27-E2 Six-Wheel Truck is An Adaptation of the Four-Wheel Truck of the Brill Swing-Link Type.

and extends from a point on the Parana River 300 miles northeast of Buenos Aires to Jujuy 700 miles farther north where it connects with the Bolivian Railway.



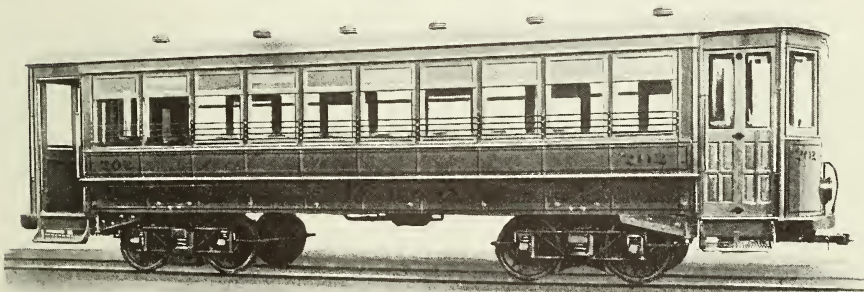
BRILL AND WASON COMPANIES AWARDED GRAND PRIX

AT the International Railway & Transportation Exposition held at Buenos Aires the Grand Prix was awarded to The J. G. Brill Company and also to the Wason Manufacturing Company. The exhibit of the Brill Company consisted of a 31-ft. semi-convertible car mounted on No. 27-E1 trucks and a 21-ft. 4-in. car mounted on a No. 21-E truck; both cars will be delivered to the Compania LaCroze, Buenos Aires, at the close of the exposition; 4 pairs of No. 27-E2 six-wheel trucks shown in preceding article; seats and springs. The Wason Company exhibited a train of five cars mounted on No. 27-E2 four-wheel trucks which will be turned over to the Ferro Carril Central of Buenos Aires. The train was described and illustrated in the June issue of **BRILL MAGAZINE** and consists of a first-class car, two second-class cars, one dining car and one combination baggage and mail car.

LIGHT WEIGHT TRAIL CARS FOR THE OGDEN RAPID TRANSIT COMPANY

BRILL PLAIN ARCH ROOF

THE Ogden Rapid Transit Company connecting Ogden, Hot Springs, Glenwood Park and Ogden Canyon, all in Utah, at present controls 80 miles of electric railway and 9 miles of steam. Besides this they now contemplate building an additional line of 14 miles. This company recently received three cars of the type shown from the American Car Company. The cars are of a closed type with stationary round front vestibule and folding doors. The top sashes are stationary and the lower arranged to drop and the seats are arranged with eight reversible and two stationary seats on each side of the car. The car is of the Brill Plain Arch Roof type, a good description of which was given in last month's BRILL MAGAZINE in the article on the Convention Car built by The J. G. Brill Company. This roof adapts itself very readily to this type of car, which is built with one aim always in view—lightness, as it not only reduces the weight of the car roof but also adds strength to the whole upper portion of the car, thus allowing a somewhat lighter side construction. The side sills are 5-in. I beams



TRAIL CARS FOR THE OGDEN RAPID TRANSIT COMPANY—The Brill Plain Arch Roof not only Reduces the Weight but adds to the Strength—The Cars Are Mounted on Brill No. 420 Trail Trucks



TRAIL CARS FOR THE OGDEN RAPID TRANSIT COMPANY—The Simplicity of the Overhead Arrangements in These Cars is Novel and Attractive

and the end sills are of white oak. From this construction it can be seen that the underframing is built with a view to doing away with unnecessary weight which is also followed out in the truck equipment, the cars being mounted on Brill No. 420 light weight trail trucks.

Length of body	28 ft. 0 in.	Weight of car body less	
Length over platforms . . .	37 ft. 0 in.	electrical equipment . . .	10,000 lb.
Length of front platform . .	4 ft. 6 in.	Weight of air brake equip-	
Length of rear platform . . .	4 ft. 6 in.	ment	1,050 lb.
Width over sills	7 ft. 3 $\frac{3}{4}$ in.	Weight of trucks	5,495 lb.
Width over posts	8 ft. 2 in.		
Seating capacity	40	Total weight	16,545 lb.

UNLOADING CARS AT DESTINATION

ONE SUCCESSFUL METHOD

ONE of the problems in connection with an order of cars is their unloading on receipt at destination and sometimes the labor is a considerable item of expense. The manner in which the Virginia Railway & Power Company unloaded 20 cars, described on another page of this issue, at a cost of \$2.66 per car is shown in an accompanying engraving. A stationary timber gantry was built over the track on which the new cars were delivered. Each car to be unloaded was brought on its flat car directly beneath the timber structure and raised from the flat with four triplex blocks. Then while the car body was suspended in the cradle the flat car was removed and the trucks brought in position so that the car could be lowered on them. As soon as this was done, the car on its trucks could be easily moved out of the way.



UNLOADING CARS AT DESTINATION—With this Arrangement the Virginia Railway & Power Company Unloaded 20 Cars at a Cost of \$2.66 Per Car

BRILL MAGAZINE

Published on the fifteenth
of each month by the

PUBLICITY DEPARTMENT OF THE J. G. BRILL COMPANY

In the interests of The J. G. Brill Company, American Car Company, John Stephenson Company, G. C. Kuhlman Car Company, Wason Manufacturing Company, Danville Car Company, Compagnie J. G. Brill.



IN the October number of BRILL MAGAZINE mention was made of the third annual announcement of the Brill prizes for senior theses on car designs. These announcements were mailed on October 20 to nearly 150 colleges and technical schools throughout the United States. Since then we have had numerous requests for additional copies of the announcement, and a number of requests for information and material from students desiring to enter the contest and submit theses. We have had a few inquiries from the heads of engineering departments relative to placing students during the summer months and will probably receive more. Electric railway engineering is a branch of technical work that has never been over crowded and there are always openings for good men. The Brill prizes are offered primarily in order to attract technical students to the electric railway field, in the hope that once

interested they may elect to specialize in that branch. The contest is looked upon with favor by the American Street and Interurban Railway Association and in fact all three of the judges who pass upon the merits of the theses are members of that association. Under these circumstances we have every reason to believe that we will have the co-operation of all the members, including the railway equipment manufacturers. With the co-operation of the railway companies interested in this educational work and with the opportunities afforded at the Brill plants, it is probable that each student can be so placed as to enable him to demonstrate his ability in this line. In connection with this, BRILL MAGAZINE wishes to hear from those companies that are on the lookout for good men, stating how many they could place during the summer of 1911, and in just what line.



IN the series of leading articles which we have been running for the last two years, no less than 15 types of cars used in the principal cities of the United States have been shown to be essentially different from each other and possessing certain distinctive features. Car body and platform lengths, seating arrangements and capacities, weights, motors and trucks, all vary to such an extent that

it may readily be perceived what a multiplicity of conditions have been considered and how great the divergence of individual opinion as to how the desired results may be accomplished. Possibly the railway operator has been too liable to view his particular field of action with a paternal eye, and his mental vision, a little circumscribed perhaps by assiduous study of local conditions, is acutely sensitive to that which is peculiar, distinctive and individual and may lead him to introduce features which interfere with what is essential for economical operation—in other words, cause him to lose in some particulars his sense of proportion. The car builder has not only faced the problem of special designing for stated conditions but, as a self protective measure, has been compelled to make provision for the severe conditions common to every road, such as rough tracks, excessive speed, overloading, etc., and has at times furnished a more heavily constructed car than necessary. This general variance in types of cars is unscientific and, at this time, when every possibility for the reduction of operating expense is being investigated by railway companies, it borders on extravagance. The cost of designing, construction and repairs is necessarily great, for special patterns and castings must be made, machinery specially arranged and it has even been necessary to construct a sample car for experimental purposes before proceeding with the order. A comprehensive

survey of the situation reveals the fact that these local differences largely responsible for the divergence in types of cars, are not as extreme as is generally imagined and it would appear that a comparatively few types would meet all contingencies. For example, it is probable that for a large percentage of the city systems in this country, a 28 ft. 10 in. semi-convertible car body with 2 ft. 6 in. post centers, and seven transverse seats on each side at the center with longitudinal seats occupying the space of two windows each at the corners, would give the most satisfactory results.



THE opportunity for “getting together” afforded by the yearly A. S. I. R. A. Convention is undoubtedly its best feature. Its atmosphere of progress and mutual interest is full of the ozone of optimism and good fellowship. Under its influence the renewal of old acquaintanceships and the making of new is particularly agreeable and easily leads to the interchange of thoughts on important subjects and the establishment of mutual understandings. In such an atmosphere, away from the regular business surroundings and yet there on business, the social relationship comes more to the front making it easier to get under the surface of things and learn

things in their truer relations and to make and receive deeper impressions. Personality is a factor in business relations and it is an advantage to both sides in a business transaction for each to know the other personally. And so we get together each year to know more of each other, for progress, for mutual interest and for good fellowship.



A MARKED improvement in commercial ethics has been plainly evidenced in all lines within the last few years and the tendency to regard business as a "game," in which shrewdness and chicanery are all important factors is rapidly declining. Though we dislike to cast reflections upon the honesty of our progenitors, we are forced to admit that the unfortunate tendency (which might be termed an instinct) is atavistic and hence the difficulty of its complete subversion. History, ancient and modern, is replete with examples of sharp practice and Nature is an incorrigible repeater. As school boys we swapped and traded, with ever an eye to the main chance and to successfully trade a plug-ugly without detection of the fraud was a feat over which we gleefully chuckled and vaingloriously boasted. That men are but children of a larger growth is a Shakespearian

axiom and though the lapse of years alters the externization of our motives, the motives remain intact. We shall not attempt to trace the current of evolution, which is responsible for this higher conception of business principles, to its source, or follow it through the sinuous channel which all reformative movements inevitably take. We realize that the new era is upon us and that the mistakes of the past are being gradually forgotten. The "heads I win; tails you lose" method is not only unmoral, but, what is infinitely more to the purpose, unprofitable. There must be mutual advantage or there will be mutual disadvantage; mutual satisfaction or ultimate dissatisfaction, and, mutual profit or there will accrue mutual loss. Under the new regime, the reputation of the house becomes a paramount consideration. Reputation depends for its existence upon worthiness and thus the elimination of the non-reputable dealer becomes simply a matter of time. Suspicion and antagonism, elements inimical to progress, are being eradicated and shrewd tactics, so eminently unsatisfactory and unscientific, are being relegated to the scrap heap of antiquated methods. The adoption of a purer system of business ethics is merely a recognition of the truth of the ancient proverb—honesty is the best policy. It is not a new idea but rather the materialization of an old ideal.

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G. C. KUHLMAN CAR COMPANY

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THOMAS BARLOW & SONS

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GIOVANNI CHECCHETTI

Piazza Sicilia, 1

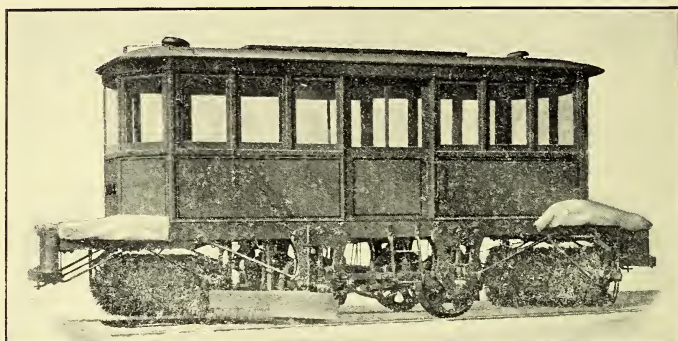
Milan

China

SHEWAN TOMES & CO.

Hong Kong, Canton

Shanghai



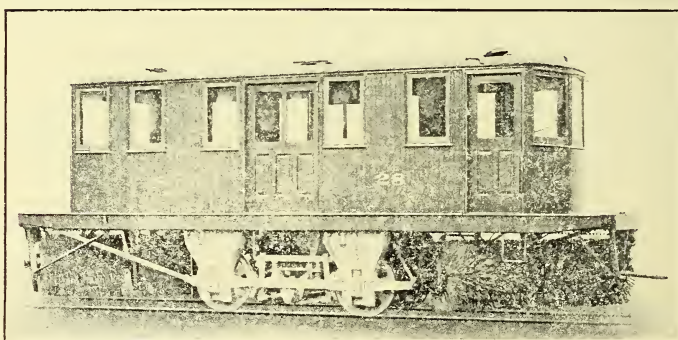
Brill Standard Short Broom Sweeper

SWEEPERS READY FOR DELIVERY

To anticipate calls for quick deliveries, a number of standard short and long broom snow sweepers have been built and can be shipped two weeks from receipt of order. The running gear can be arranged for any track gage. Two motors are required for propelling the car and one for operating the brooms. No electrical equipment will be furnished unless ordered.

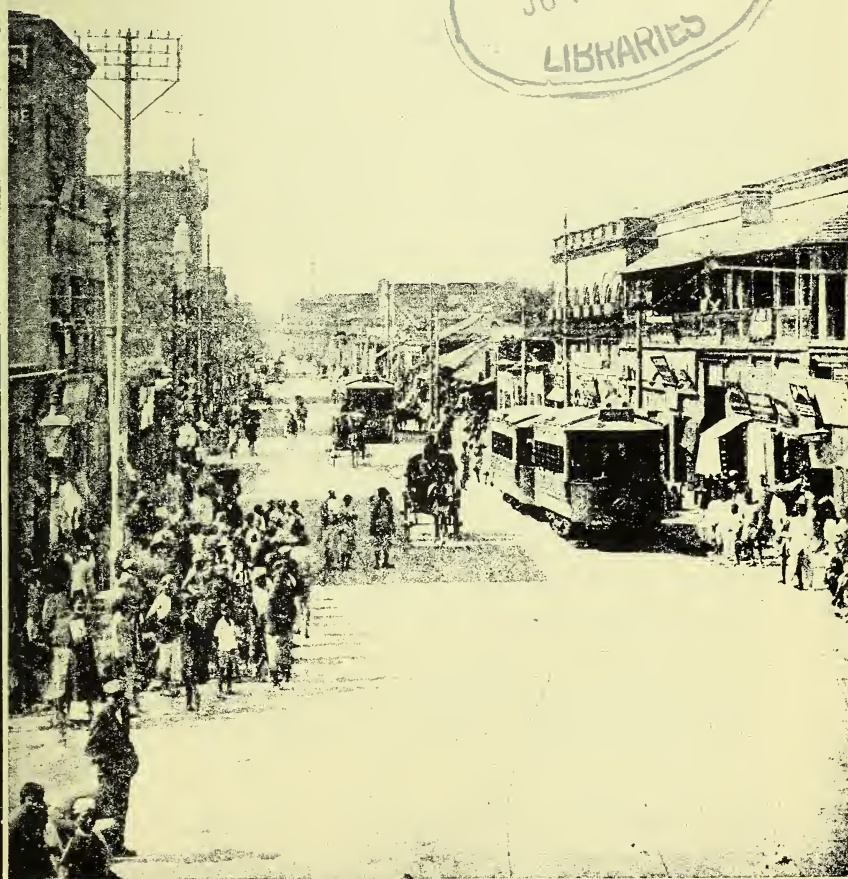
	Long Broom	Short Broom
Length over all	27 ft. 8 in.	27 ft. 6 in.
Width over all	8 ft.	6 ft. 10 $\frac{1}{4}$ in.
Height rail over trolley board	11 ft. 4 in.	11 ft. 6 in.
Truck wheel base	6 ft. 7 in.	6 ft. 0 in.
Weight without motors	15,000 lb.	13,800 lb.

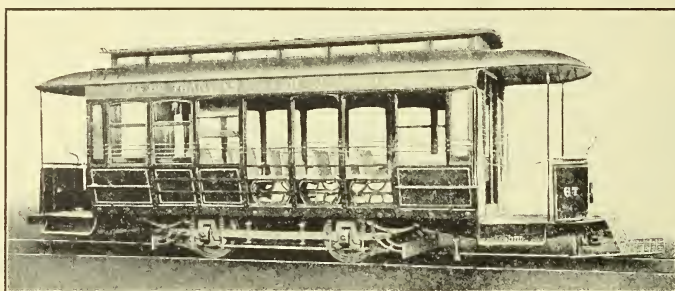
THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



Kuhlman Standard Long Broom Sweeper

BRILL MAGAZINE



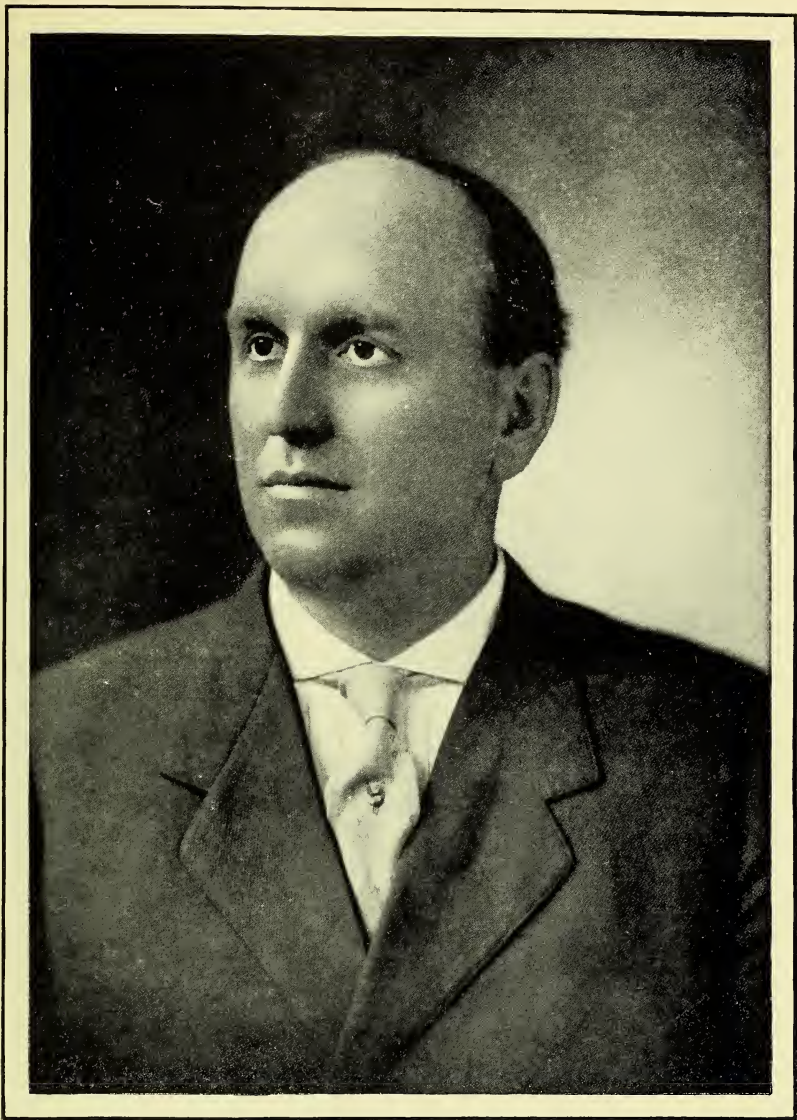


THE BRILL CONVERTIBLE CAR

Patented

Though used in eighty cities at home and abroad, this car is practically unknown to a considerable number of railway operators in cities where traffic conditions allow the use of open cars with running boards. There is no more popular car for summer service than the ordinary open car with accessible side entrances and the open car can be had combined with a genuine closed car, one that can be warmed with the ordinary number of heaters in winter, even in the northern states. It is quite possible that this car might prove the most economical for your service and the most satisfactory for your public. The running board is not an essential feature as you will see by the above illustration. Shall we send you complete information on this self-contained, durable and thoroughly practicable convertible car?

THE J. G. BRILL COMPANY
PHILADELPHIA - - - PENNSYLVANIA



W. Stevens



BRILL MAGAZINE

Vol. IV

DECEMBER, 1910

No. 12

R. P. STEVENS

[WITH PORTRAIT INSERT]

RAY P. STEVENS, president and general manager of the Lehigh Valley Transit Company, was born April 3, 1877, in Eastport, Maine. He prepared for college at the Ellsworth, Maine, High School and the E. M. S. Seminary at Bucksport, Maine, and in 1898 graduated from the University of Maine with the degree of Bachelor of Electrical Engineering. During the period he was attending school and college he conducted a general electric and contracting business in Ellsworth, Maine, equipping many of the large summer hotels at Bar Harbor and vicinity. After finishing college he went to work first for the Bell Telephone Company and then for the General Electric Company at Lynn, Mass., at the same time living in Boston and taking post graduate work at the Massachusetts Institute of Technology. His first electric railway connection was in Everett, Washington, where he practically built an entirely new system, including power house, shops, etc. Before he had finished this he was persuaded to manage the railway and lighting properties in Everett and under his capable management the earnings doubled in less than five years. He next went to Auburn, New York, as general superintendent of the Auburn and Syracuse Electric Railway Company where he remained two years. During this short period he made so notable a showing that he was offered the presidency of the Lehigh Valley Transit Company which controls nearly 150 miles of electric railway as well as considerable lighting property throughout southeastern Pennsylvania. At that time the company was yearly showing a large deficit; now it is earning enough to pay a 4% dividend on preferred stock. Mr. Stevens, at the time of his election as president was undoubtedly the youngest railway president in this country. Since then he has twice been elected president of the Pennsylvania Street Railway Association.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

CALCUTTA, INDIA*

CALCUTTA, the metropolis and capital of India, is the greatest trade center of the Orient. It is situated on the eastern side of the Hooghly River, 80 miles from the Bay of Bengal, and has ample wharfage and anchorage for the immense fleets of vessels by which a vast commerce is carried on with

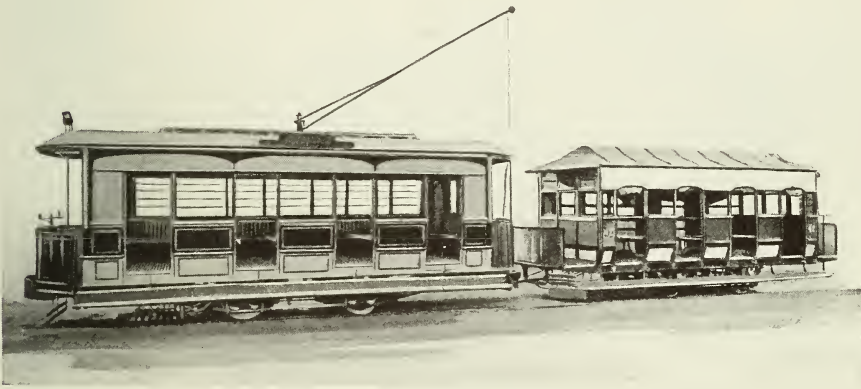


CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—All of the Closed and Open Motor Cars are Operated with Trailers—The Closed Cars Seat Four Passengers on the Rear Platform—All Motor Cars are Mounted on Brill No. 21-E Trucks

all parts of the world. The city is the terminus of four great railway systems which extend to all parts of the Empire and is the distributing point of the large and varied commerce of the Ganges Valley, Central India, Assam, Burmah and the East Indian coast. Calcutta has a university and numerous colleges; prints 50 newspapers and is the center of Indian official life. Including certain adjoining suburbs and the municipality of Howrah, on the opposite side of the river, the population is about one and one-quarter millions. The European

* This series of articles will be continued during the coming year. The present article is the twenty-fourth.

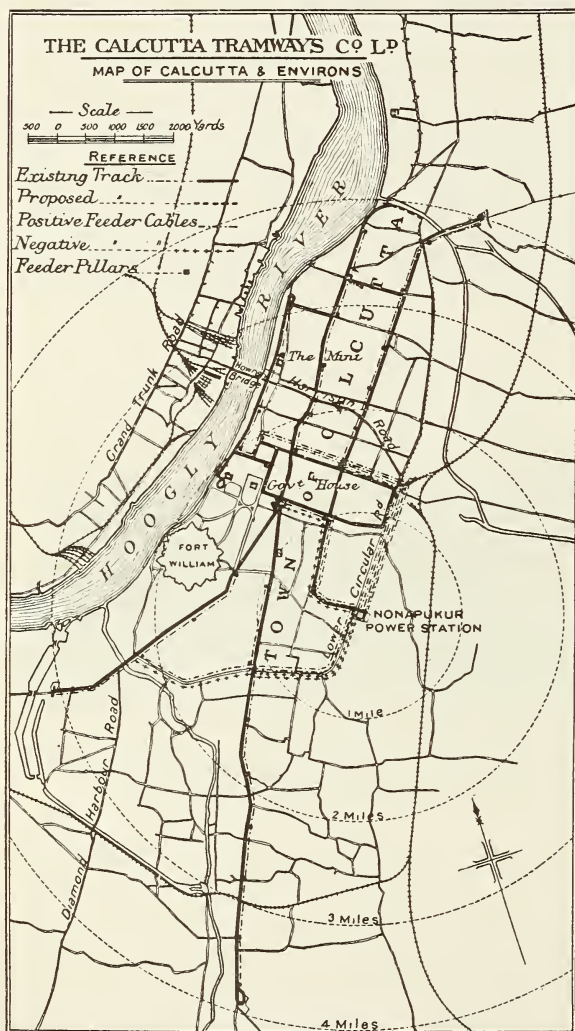
population does not exceed 15,000 during the most favorable season of the year. The climate is semi-tropical with a range of temperature of about 20° Fahrenheit and an annual rainfall of 65 inches. From June to September severe wind storms frequently sweep over the city, sometimes with destructive effect. Occasionally, during the rainy season, the cars are stalled by floods in certain parts of the city. The ground is flat and is composed of an alluvial desposit only 20 feet above sea level. The city proper is divided into three parts: the European business district at the center and bordering the river; the native residential and business district in the northern part; and the European residential district in the southern part. In the native section the streets are mostly narrow and the houses and shops generally poor and



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—The Open Motor Cars Seat 40 Passengers—There are no Doors at the Entrances—Some of the Old Horse Cars are Used as Trailers—The Motor Cars are for First-class and the Trailer for Second-class Passengers

crowded; the palaces of some of the native princes and rajahs stand side by side with the huts of the poorer classes. Within recent years a wide road has been cut through this section from the railway stations on the eastern side of the city to the floating bridge which forms the principal connection with Howrah. Other broad streets have been built and a comprehensive scheme for the improvement of both streets and houses throughout the district is being promoted by the government. Fifteen miles of new thoroughfares and a number of open places are proposed. The European section has wide well-paved roads and palatial residences.

The tramway system is composed of eleven sections with most of the lines radiating from the central part of the city, which is the governmental and European business district. Three lines extend through



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the native portion of the city to the north and one line crosses these traversing the Harrison Road, the main artery which divides this district. Two lines run southward, one of them through a densely populated suburb and having on its route a famous Hindoo temple to which crowds are brought from all parts of the city throughout the year and during certain festivals the car service has to be doubled; the other line parallels the river and serves a populous suburb in the neighborhood of certain of the great docks. On this line the traffic is greatly augmented by the multitudes attending the race course in the large city park

known as the Maidan. The principal income is derived from the business and professional classes and government employees. The

laboring classes are too poor to use the cars regularly. The Europeans form too small a part of the population and use the cars too little to be counted as a factor in the earning power. Aside from the regular traffic, the Hindoo temples and Mahomedan mosques draw large crowds at all times, especially on certain days and occasions when thousands of devotees gather from all points of the city and surrounding districts for religious exercises.



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CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Old Court House Street—Cars of Two Sections of the Tramway System Traverse this Thoroughfare between the European Commercial and Residential Districts

The entire tramway system is operated by the Calcutta Tramways Company. The lines are double-tracked throughout and are being extended in different parts of the city and suburbs and it is proposed to continue the operations outside the municipal limits under a government subsidy to improve communication with suburban districts. With the exception of thirty radial trucks used on the Howrah division the motor cars are all mounted on Brill No. 21-E trucks. There are 171 motor cars of both open and closed types each of which is operated with an open trailer. The motor cars measure 20 ft. 6 in. over the

end panels. The driver's platform on all motor cars is 2 ft. 6 in. long; the conductor's platform on open cars is 2 ft. 3 in. long; and on closed cars 5 ft. long. Width of cars over side posts is 7 ft. 6 in.; over all 8 ft. 4 in. The closed cars seat 27 passengers and the open car 40 passengers. The weight of a car body is approximately 10,000 lb. and the weight of a car complete with truck, motors and electrical equipment, brakes, etc., is about 20,000 lbs.

As will be seen in the illustrations, the cars have entrances on one



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Esplanade Junction—Twelve Hundred Trains of Two Cars Each Arrive Here Daily

side and in the open motor cars the opposite side is panelled the full length. The windows on the open side are furnished with curtains; this arrangement gives more protection from the severe climatic conditions than that of the ordinary open side in which one curtain extends from post to post and whenever raised exposes the passengers at the ends of both seats. The seats in all cars face forward as the cars are operated at one end only, loops being provided at the terminals. Plain arch roofs without headlinings, a plain finish and simplicity in

details characterizes both open and closed cars. The framing and interior woodwork is entirely of teak which is proof against the ravages of insects and is little affected by alternating heat and moisture.

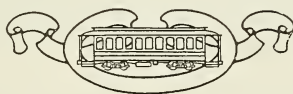
The cars are all run in trains of two, the motor car being for first-class and the trailer for second-class passengers, the service beginning at 5 A. M. and ending at 10.30 P. M. with considerable traffic in the early hours and the heaviest between 9.30 and 11 A. M. and 4.30 to 8 P. M. There are regular stopping places along the lines but, on account of



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CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE—Chowringhee Road—Around this Park, Chowringhee Place, are Government Buildings, Hotels and Residences of Europeans

the severe condition of heat and rain, passengers are allowed to enter and leave at any point. Motormen, conductors, checkers and inspectors are natives.



MORE PAY-AS-YOU-ENTER CARS FOR PORTLAND, OREGON

THE American Car Company has just delivered a lot of 40 closed Pay-As-You-Enter cars to the Portland Railway, Light and Power Company and has 40 of the same type cars on order for delivery next year. This company is rapidly equipping its lines with prepayment cars, having received in the last three years nearly 150 Pay-As-You-Enter cars. In October, 1908, and also in December, 1909, numbers of BRILL MAGAZINE, descriptions are given of cars for Portland. The first article gives a description of the earliest prepayment cars, and trailer cars delivered the preceding year, while the second article deals with traction conditions in Portland. The last lot of cars delivered are of two lengths, 28 ft. 8 in. and 31 ft. 6 in., the illustrations showing the latter. With the exception of being somewhat longer and a few inches wider, the cars just delivered are practically identical to those furnished during the past two years. The Portland Railway, Light and Power Company at present owns 241 miles of track and operates about 450 cars, controlling practically all the street railway properties and all the electric light and power plants in Portland as well as having large outside holdings. The Portland lines are practically divided into two divisions, the city lines proper and the suburban lines. The latter use a



MORE PAY-AS-YOU-ENTER CARS FOR PORTLAND, OREGON—The Cars Are Mounted on Brill No. 22 Special Single-motor Trucks—Under Most Conditions a Two-motor Equipment is Sufficient for City Cars



MORE PAY-AS-YOU-ENTER CARS FOR PORTLAND, OREGON—Longitudinal Seats Were Adopted on Account of Their Increased Capacity in Order to Meet the Heavy Rush Hour Service

suburban type of car much longer and heavier than those described in this article. The city lines are short and with one exception almost without grades. For this class of service a light weight car with a maximum capacity is imperative. The first cars of this type for Portland were mounted on Brill No. 27-G double motor trucks, but due to the favorable conditions it was decided that a two motor equipment would be sufficient for each car. Accordingly a motor was removed from each truck. This was not entirely satisfactory, as the heavy double-motor truck was unnecessary for a single motor equipment. Exhaustive tests showed that besides carrying this extra weight all the time only a little more than 65% of the weight of the car was available for adhesion, that is, rested on the driving wheels. To meet these conditions the Brill Company designed the 22-Special truck which was a much lighter truck and allowed a decrease of 500 lb. per car in the weight of the bolsters at the same time increasing the per-



MORE PAY-AS-YOU-ENTER CARS FOR PORTLAND, OREGON—The Platform is Similar to that in Use by Most of the Lines Which Have Adopted the P-A-Y-E Cars as Standard

centage of the weight resting on the driving wheels to about 70%. This truck was tried out on the lines of this company and proved so satisfactory that it was immediately adopted as standard type of truck for city cars for that as well as the other Clark properties among which are the East St. Louis and Suburban; Alton, Granite and St. Louis Traction Co.; East St. Louis Ry. Co.; Rockford and Interurban Ry. Co.; Springfield Ry. and Lt. Co.; Grand Rapids Ry. Co.; Saginaw-Bay City

Ry. Co.; Columbus Ry. and Lt. Co.; Chattanooga Ry. and Lt. Co.; Lookout Mountain Ry. Co.; and the Lewiston, Augusta and Waterville St. Ry.

The side sills are each made up of two members, $2\frac{1}{2}$ by $7\frac{5}{8}$ -in. and $1\frac{1}{8}$ by $7\frac{1}{8}$ -in. yellow pine reinforced with a steel plate $15\frac{1}{2}$ by $\frac{3}{8}$ -in. with $2\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{1}{2}$ -in. angle irons riveted to top and $4\frac{1}{2}$ by 3 by $\frac{3}{8}$ -in. angle iron riveted to bottom to prevent buckling and of such proportions and attached in such a manner as to give the construction the general characteristics of a Z bar. The end sills are of $5\frac{1}{4}$ by 7-in. oak reinforced with a 6 by $\frac{1}{2}$ -in. steel plate extending the whole length of the sill and bent at right angles at each end and bolted to the side sills. All the cross sills are of white oak supported and

held in place by sockets formed by special castings of the best quality of malleable iron riveted to steel plate before it is attached to the wooden sill. At each cross sill a $\frac{3}{4}$ -in. tie rod is used with cup washer on the outside of each side sill.

The general dimensions of the cars are as follows:

Length of body	31 ft. 6 in.	Platform to car floor	10 $\frac{1}{2}$ in.
Length over platforms .	46 ft. 10 in.	Type of trucks	Brill 22 Special
Length of each platform	7 ft. 8 in.	Motors	GE-210 2-65 h. p.
Centers of side posts . .	2 ft. 8 $\frac{3}{4}$ in.	Wt. of car body less elec-	
Width over sills	8 ft. 0 in.	trical equip. (approx.) .	19,000 lb.
Width over posts	8 ft. 6 in.	Wt. of electrical equip-	
Extreme width	8 ft. 10 in.	ment (approx.)	8,050 lb.
Track to sill	2 ft. 7 $\frac{1}{2}$ in.	Wt. of air brake equip-	
Side sill over trolley		ment (approx.)	1,500 lb.
boards	9 ft. 6 $\frac{3}{8}$ in.	Wt. of trucks (approx.) .	9,920 lb.
Floor to headlining . . .	8 ft. 4 in.	Wt. of motors (approx.) .	6,600 lb.
Track to step	1 ft. 3 $\frac{1}{2}$ in.		
Step to platform	1 ft. 1 in.	Total approximate weight	45,070 lb.



ELECTRIFICATION OF STEAM RAIL- WAY SYSTEM IN NORTHERN ITALY IN THE RIVIERA

IN northern Italy, steam tramway lines were built some thirty years ago, by foreign companies (mostly Belgian and English), connecting the larger cities with the small towns, throughout the Alpine valleys and along the Riviera.

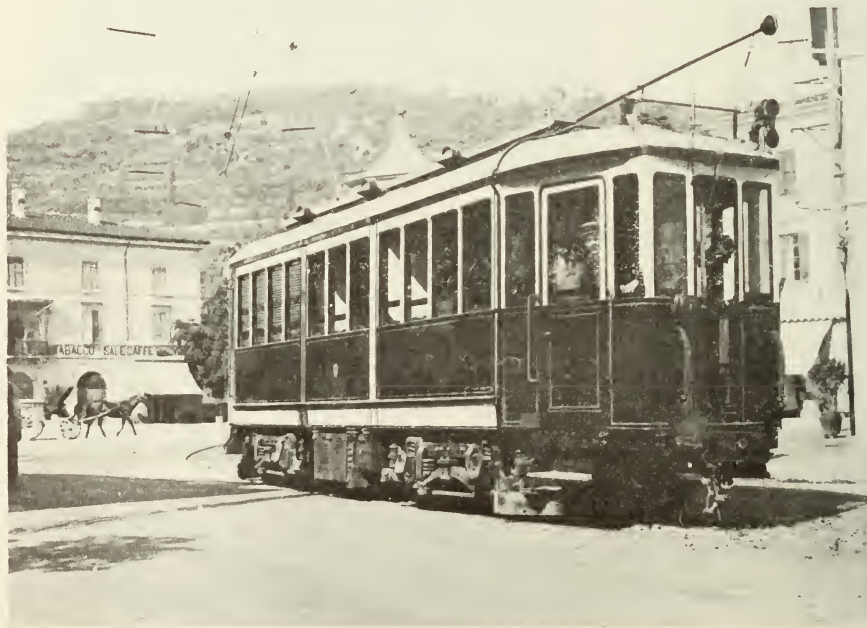
These lines are lightly equipped and follow the important Provincial or National roads, being subject to their irregularities and in some places have a gradient of 50 or 60%, though the average gradient is about 35%.

Concessions were formerly obtained from the owner of the Road, Commune or Province and the local communities contributed for such

repairs and special construction as were necessary to the laying of the track, but these lines have proved such an important economic factor in the regions they traverse that the Government has taken upon itself the granting of concessions and provides an annual subsidy for a period of fifty years.

The track on such lines is generally light; Vignole rails of 18 to 23 kilos per meter are laid on oak ties 0.75 to 0.80m. apart, in ballast, the rails level with the ground. The gage is usually 1.445m. and on some western lines 1.10m. and the cost of laying varies from 15000 to 25000 liras per kilometer, the yearly maintenance being about 5 or 6% of the cost. The traction expense is about one-third and the fuel expense about one-sixth of the total cost of maintenance. Italy not being a coal producing country, the fuel constitutes a large item on the tramway budget and without the Government subsidies a steam line would be an unprofitable enterprise.

The problem of electrification of such lines has long been contem-



ELECTRIFICATION OF STEAM RAILWAY SYSTEM IN NORTHERN ITALY—The Cars Have a Seating Capacity of 40 Passengers and are Arranged for Multiple Unit Control—They are Mounted on Brill No. 27-G Trucks

high tension currents, direct or alternating, a single power station will serve the whole system, reducing considerably the first cost of distribution and the working expenses. The overhead construction is a matter requiring careful study, in order to secure strength and safety at the lowest possible cost and reduce maintenance and repairs to a minimum. The American catenary system fills these requirements, combining the necessary strength and insulation. As to expenses: The working of a steam tramway in Italy costs from 1.20 to 1.50 lire



ELECTRIFICATION OF STEAM RAILWAY SYSTEM IN NORTHERN ITALY—Provincial Road Near Tormini.
The Overhead Construction is the American Catenary System

per train-kilometer. After electrification, the passenger rates may be cut in half, the number of trains per day doubled and the total expense will not exceed one half of the above figures.

A recently electrified line in Northern Italy is that between the town of Brescia (east of Milan) and the Lake of Garda. This line, 29 miles in length, built and operated by the Societa-Elettrica Bresciana, runs from Brescia to Virle along a splendid highway, then through a

valley, with numerous factories and mills; over the Provincial road to Tormini and then along the coast, connecting a number of resorts of the Riviera to Toscolano. The line is fed from two end sub-stations, one in Brescia, the other in Salo.

The cars, seating forty passengers each, are arranged for multiple unit control. The Brill 27-G trucks, on which the motor cars are mounted, are equipped with G. E. Z. 50 H. P. motors and have a 1400mm. wheelbase, the distance between the truck centers being



ELECTRIFICATION OF STEAM RAILWAY SYSTEM IN NORTHERN ITALY—Train on Private Right of Way Near Salo Showing Fill and Culvert Construction

4900mm. The total length of the car over the two closed, vestibuled platforms is 10.5 meters and 11.12 meters over the bumpers. The Company has eight of these cars, each drawing three 2 axle trailers, thus constituting a very light train of large capacity.

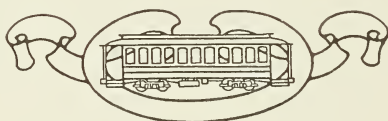
For its interurban service between Brescia and the Riviera, the company was forced to adopt a narrow bodied car, reducing the outside cross dimensions to 2.20m. One motor car is in operation, the

electrical equipment being the G. E. Z. 217 four motor series with multiple unit control. The car, which is of Italian make, draws two or three trailers, and each truck is equipped with two 600 v. 45 H. P. motors.

The suburban cars connect two different lines of about four miles each in length. These cars are 8100mm. over the platform ends; seat 20 passengers, with room for 20 more on each platform.

The power required for the railway is generated in several hydraulic plants, about 50 kilometers from Brescia and is transformed in 1200v. direct current in two sub-stations, one in Brescia, the other in Salo. A favorable circumstance to be noted is, that the sub-stations are located near the extremities of the lines and are fed by separate generating stations.

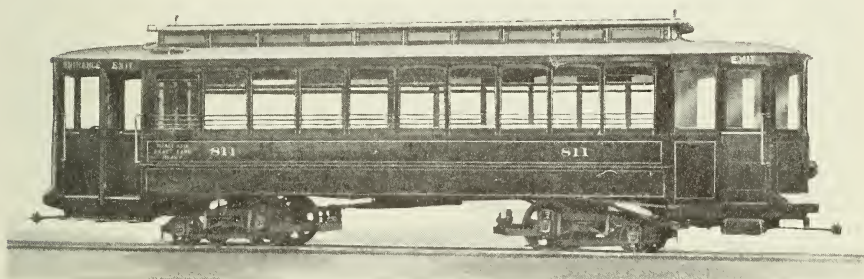
The results of the electrification of this road have far exceeded the hopes of those who engineered the enterprise. The construction of the line, trials of new rolling stock, instruction of men and the complete installation of the new electric service was accomplished without interrupting the old service in the least. This contributed largely to the financial success of the undertaking and the traffic is steadily increasing.



PAY-AS-YOU-ENTER CARS FOR THE ROCKFORD & INTERURBAN RAILWAY CO.

CHANNEL STEEL PLATFORM KNEE

DURING the past month the Rockford & Interurban Railway Co. placed in operation on its Rockford lines an initial equipment of 28-ft. P-A-Y-E cars mounted on single-motor trucks. The P-A-Y-E arrangement is of the usual type for double-end cars and includes single swing doors at the entrance and rear exit and sliding door at the front exit. The plat-

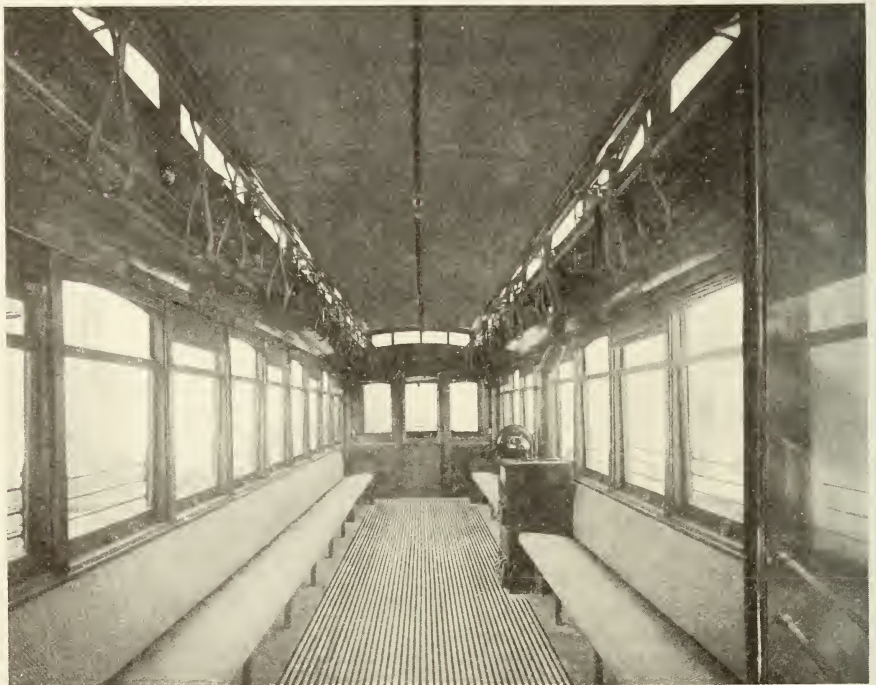


PAY-AS-YOU-ENTER CARS FOR THE ROCKFORD & INTERURBAN RAILWAY CO.—The Cars are for Use on the Company's City System in Rockford. They Are Mounted on Brill No. 39-E Type of Single-motor Trucks

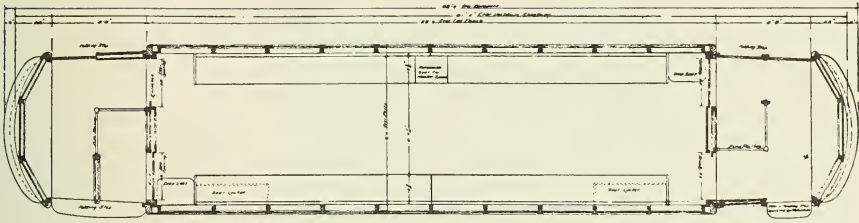
forms are 6 ft. 6 in. long and supported by the new type of channel steel knee which was designed at the Kuhlman plant where the cars were built and which is coming into standard use at the several Brill plants. This knee has been subjected to thorough tests and proved capable of sustaining three times the weight it would be subjected to by a crowded platform. Aside from its strength it has the advantage of lighter weight and better appearance over the plated timber knee. This knee was patented some time ago and has been in use for a considerable period, but was introduced to the railway field generally at the October Atlantic City Convention where it attracted much attention

and favorable comment. It is another indication of the approaching use of steel in car framing to obtain a lighter and stronger construction and being made of structural material has advantages over the special pressed shapes in being lighter, stronger and costing less. It is hardly necessary to point out the importance of this improved member in association with long platforms and the lighter construction demanded at present.

The photographs show the general details of the cars and make an extended description unnecessary. The upper window sashes are stationary and the lower drop into covered pockets. The diagram shows the seating arrangement and indicates that the heater at the center is removable and may be replaced by a seat. The heater is the Peter Smith Company's forced ventilation in which the fresh air is taken from beneath the car through a perforated plate under the



PAY-AS-YOU-ENTER CARS FOR THE ROCKFORD & INTERURBAN RAILWAY CO.—The Forced Draft Ventilating Heater Is Removed and a Section of Seat Substituted during the Summer



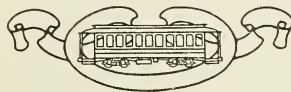
PAY-AS-YOU-ENTER CARS FOR THE ROCKFORD & INTERURBAN RAILWAY CO.—The Floor-plan Shows the Single Folding Seats at Opposite Corners of the Car and the Location of the Heater

heater, is then drawn up into the body of the heater and forced down into an air tight compartment surrounding a hot cylinder and then into ducts leading along the side of the car below the seats.

Along with these cars was a shipment of five 22-ft. single-truck cars mounted on Brill No. 21-E type of single-trucks. The platforms are vestibuled and arranged with entrance at one side only. The cars are for double end operation and will be used on the city lines in Rockford.

The dimensions of the larger cars are as follows:

Length of body	28 in. 0 in.	Seating capacity	34
Length over platform	41 ft. 0 in.	Type of trucks	Brill 39-E
Length of platforms	6 ft. 6 in.	Type of motors	G. E. 57. 2-50 h. p.
Centers of side posts	2 ft. 8 in.	Weight of body less electric	
Width over sills	8 ft. 0½ in.	equipment	18,400 lbs.
Width over posts	8 ft. 4 in.	Weight of electrical equip-	
Extreme width	8 ft. 7 in.	ment (approx.)	1,300 lbs.
From track to side sills . . .	2 ft. 8 in.	Weight of air brake equip-	
From side sills over		ment (approx.)	1,600 lbs.
trolley boards	9 ft. 5¾ in.	Weight of trucks	9,300 lbs.
From floor to headlining . .	8 ft. 5¾ in.	Weight of motors	
From track to step tread . .	15¾ in.	(3300 lb. each)	6,600 lbs.
From step tread to platform	14½ in.		
From platform to car floor	9 in.	Total weight	37,200 lbs.

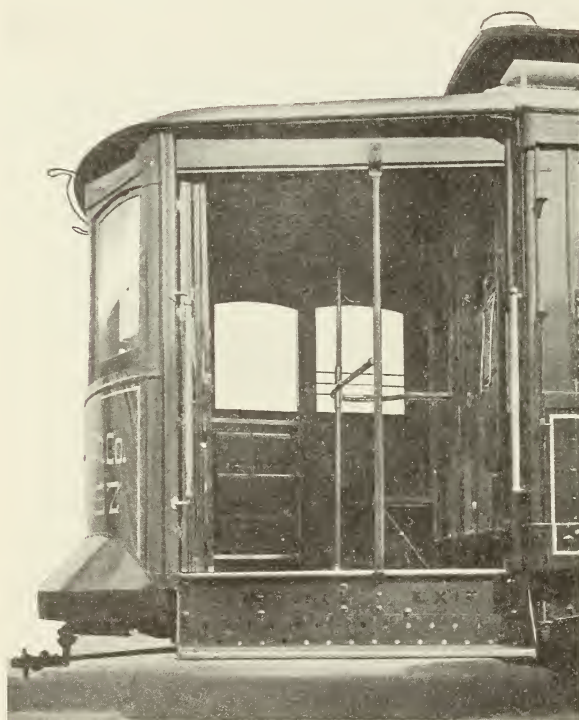


SEMI-CONVERTIBLE CARS FOR SAN ANTONIO

SAN ANTONIO TRACTION COMPANY

THE seating arrangement of the latest lot of cars delivered to the San Antonio Traction Company by the American Car Company is particularly interesting. In the car body the seats are the usual transverse arrangement with corner seats occupying the space of a single window. The corner seats are permitted by the fact that the doors slide into recesses at the sides and

a division post is used at the center. This arrangement of the bulkhead doors provides room for platform seats. One, accommodating four passengers, folds against the body at the entrance side and a single folding seat is located at the opposite side. Thus the front platform can be used, if desired, as a smoking compartment. The window posts are spaced 2 ft. 6 in. a part which is two inches shorter than usual but is now generally conceded to allow a seating plan with a satisfactory

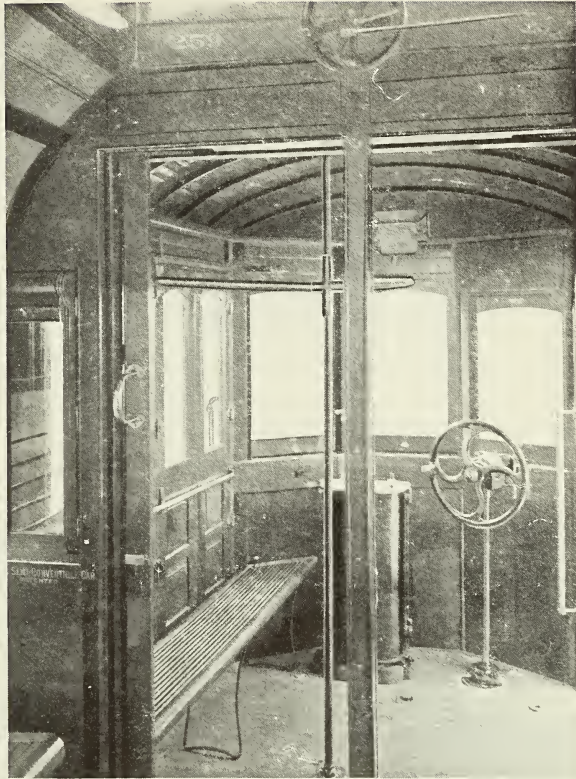


SEMI-CONVERTIBLE CARS FOR SAN ANTONIO—The Pay-As-You-Enter Rail is Curved to make Room for the Conductor Without Obstructing the Rear Exit—The Folding Single Seat and the Folding Longitudinal Seat Accommodate 5 Passengers on the Front Platform

width between the seats. This gives the same seating accommodation in a car body 28 ft. 10 in. long as in a car 30 ft. 8 in. long with window posts spaced 2 ft. 8 in. apart. The seating capacity of the car body is 44 and the platform 5, making a total of 49. A four-leaf folding door hinged against the vestibule corner posts closes the entrance and a single sliding door closes the front exit. The steps operate in conjunction with the doors. The railing which divides the passage ways on the platforms is brought

to the division post between the doors and is curved in a manner to allow the conductor to stand out of the way of passengers leaving by the rear exit. This railing is brought around close to the folding doors at the side and is arranged to slide up on vertical pipes and securely locked overhead and out of the way of passengers.

Semi-convertible cars have long been used on the San Antonio lines, a description of a shipment being given in the June, 1907, issue of BRILL MAGAZINE, together with a description and photographs of the railway system. During the past year most of the P-A-Y-E cars built for various parts of the country have been of the semi-convertible



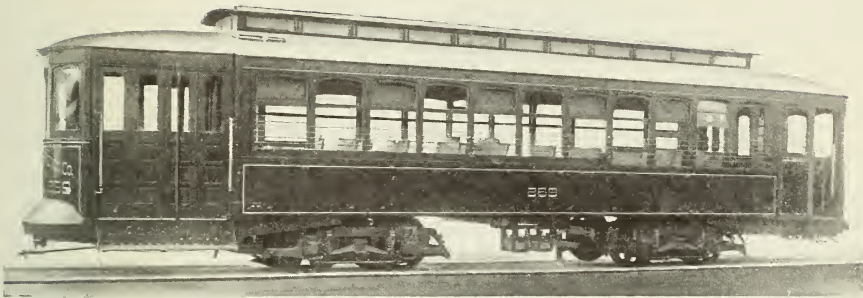
SEMI-CONVERTIBLE CARS FOR SAN ANTONIO—The Seat Against the Single Folding Door Folds up Against the Bulkhead when not in Use—The Pay-As-You-Enter Rail Slides up out of the Way of Passengers

type (each of the four P-A-Y-E cars described in this issue of BRILL MAGAZINE are of the semi-convertible type). Whether for a mild climate such as that of San Antonio or for the climate of the northern cities, the semi-convertible feature is in general demand and is coming into standard use in the larger cities of the country. In San Antonio for the larger part of the year the windows are raised entirely into the roof pockets, but are always available for protection from wind and rain; therefore, passengers have what is practically an open car in the summer and in the winter the interior is bright and attractive. In connection with this window system, the standard framing construction includes a 15 by $\frac{3}{8}$ -in. steel plate on the inside of the sills which eliminates the necessity of inside and under trusses, and, being secured to posts, adds to their support.

The Brill No. 27-G truck is the standard truck of the system and



SEMI-CONVERTIBLE CARS FOR SAN ANTONIO—The Window Posts are 2 ft. 6 in. apart Giving the Same Seating Capacity in a Car 28 ft. 10 in. long as in a 30 ft. 10 in. Car with Window Posts 2 ft. 8 in. Apart

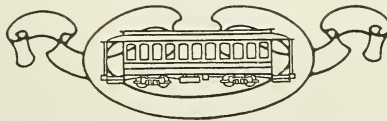


SEMI-CONVERTIBLE CARS FOR SAN ANTONIO—During the Larger Part of the Year the Windows are Raised into the Roof Pockets Giving a Practically Open Car—The Car Body is Mounted on Brill No. 27-G1 Trucks

has a wheel base of 4 ft. 6 in.; the track gage is 4 ft. The lines have a trackage of 65 miles and 160 cars are in operation.

The general dimensions of the cars are:

Length of body	28 ft. 10 in.	Seating capacity	44
Length over platforms	42 ft. 10 in.	Type of trucks	Brill No. 27-G-1
Length of platforms	7 ft. 0 in.	Type of motors	G. E. 54—4-25 h. p.
Centers of side posts	30 in.	Weight of body less electric equipment (approx.)	19,000 lb.
Width over posts at belt	8 ft. 0 in.	Weight of electrical equipment (approx.)	8,499 lb.
Extreme width	8 ft. 4 in.	Weight of air brake equipment (approx.)	1,500 lb.
From track to side sills	32½ in.	Weight of trucks, less wheels	3,420 lb.
From sills over trolley boards	9 ft. 6 in.	Weight of motors, each	1831 lb.
From floor to headlining	8 ft. 4½ in.		
From track to step tread	17⅞ in.		
From tread to platform	14 in.		
From platform to car floor	8 in.		
		Total approximate weight	39,743 lb.



EQUIPMENT FOR THE MISSOULA STREET RAILWAY COMPANY

ONE-MAN PREPAYMENT

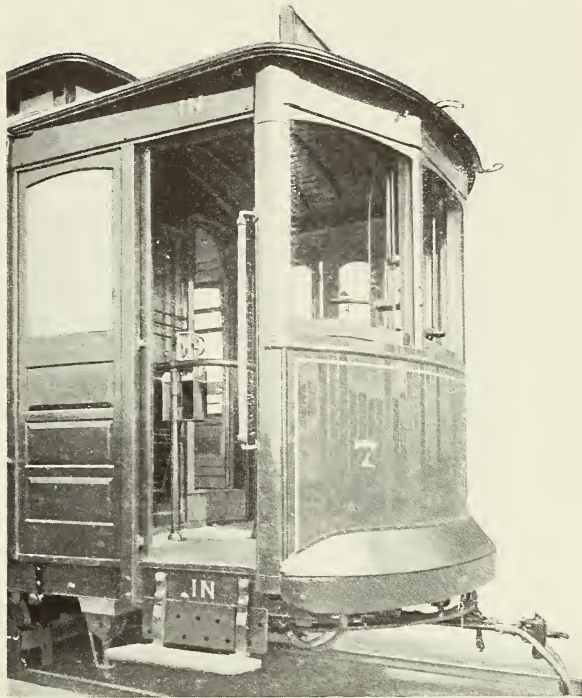
THE Missoula Street Railway Company, Missoula, Mont., recently received a second shipment of cars from the American Car Company consisting of four semi-convertible Pay-As-You-Enter cars and one construction car. The first delivery was of three cars duplicates of those described in this article. These eight cars, together with two 14-seat open trail cars and one Brill short-broom sweeper bought from The J. G. Brill Company form the initial equipment of this company.

Missoula is a city of about 10,000 inhabitants located near the western boundry of Montana and is one of the few smaller cities to install new equipment from the start. On account of the comparatively light travel it was deemed best to dispense with the conductor, so each vestibule is arranged to be locked or thrown open for exit and entrance. The double end arrangement was necessary as the lines are built to operate the cars in either direction. The rear vestibule is always locked and on the front vestibule the sliding door to the right



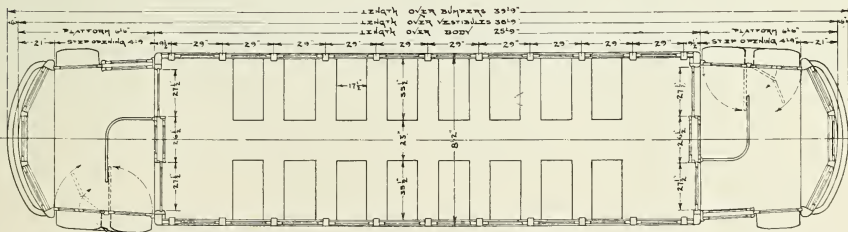
EQUIPMENT FOR THE MISSOULA STREET RAILWAY COMPANY—The Rear Vestibule is Closed and the Entrance and Exit are on Opposite Sides of the Front Platform—The Cars Are Mounted on Brill No. 39-E Single-Motor Trucks

of the motorman is the entrance and the folding door next to the body of the car on the left of the motorman is the exit. Both of these doors are controlled with levers by the motorman. The front folding door to the left is locked. Directly in front of the bulkhead and attached to the iron rail which divides the entrance and exit is placed a Brill No. 4-A fare box. With this arrangement the motorman is able to do his own work as well as that of the conductor without leaving his station at the front of the car. The steps are all folding and are operated in conjunction with the doors, being folded up when the doors are closed and dropped when the doors are opened.

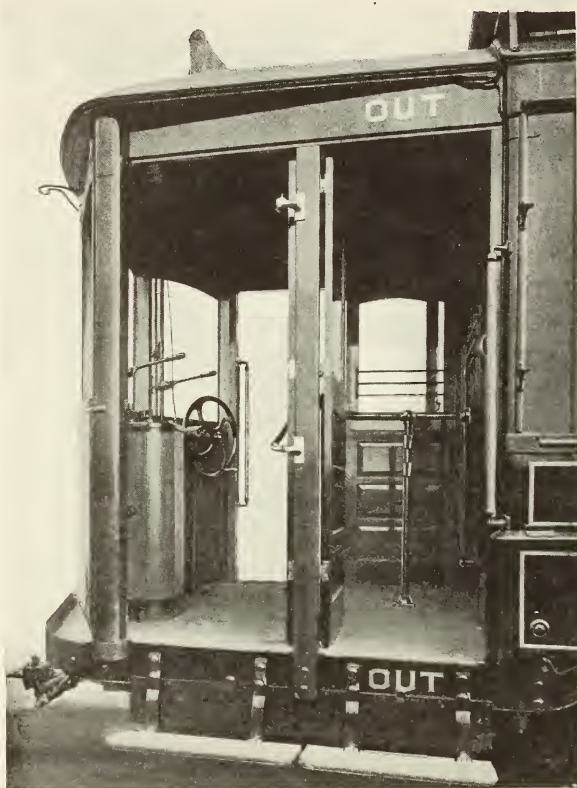


EQUIPMENT FOR THE MISSOULA STREET RAILWAY COMPANY—The Entrance is at the Motorman's Right—Brill Fare Boxes are Used in Connection with the One-man Prepayment System

The side sills are 4 by 7 $\frac{3}{4}$ -in. yellow pine plated with $\frac{3}{8}$ by 12-in.



EQUIPMENT FOR THE MISSOULA STREET RAILWAY COMPANY—The Floor Plan Shows the Step Arrangement—The Three Cars in the First Order had a Single Step at the Left of the Motorman and the Last Four had Double Folding Steps



EQUIPMENT FOR THE MISSOULA STREET RAILWAY COMPANY—The Exit is at the Motorman's Left—The Doors Are Operated by Levers Directly in Front of the Motorman

steel on the inside. The car is equipped with Brill patent angle iron buffers and Dumpit sanders. The exterior is painted a rich dark green and is decorated with a gold stripe. The interior of the car is ash and the ceiling 3-ply birch veneer. The seats are Brill Winner type. The window frames are ash to match the interior and stained mahogany on the exterior. The sashes are arranged to push up into ceiling pockets, the upper sash working automatically with the lower. The cars are mounted on Brill No. 39-E

single-motor trucks and as can be seen from the engraving each car is equipped with air brake hose for trailer attachment. The dimensions are as follows:

Length of body	25 ft. 9 in.	From sills over trolley boards	9 ft. 7 $\frac{3}{8}$ in.
Length over platforms	38 ft. 9 in.	From floor to headlining	8 ft. 4 $\frac{3}{8}$ in.
Length of platforms	6 ft. 6 in.	From track to step	1 ft. 4 $\frac{3}{8}$ in.
Centers of side posts	2 ft. 8 in.	From step to platform	1 ft. 2 in.
Width over sills	7 ft. 11 $\frac{1}{2}$ in.	From platform to car floor	9 $\frac{1}{2}$ in.
Width over posts	8 ft. 2 in.	Seating capacity	32
Extreme width	9 ft. 2 in.	Type of truck	Brill No. 39-E
From track to sills	2 ft. 8 $\frac{1}{4}$ in.	Motors	G. E.-219 2-50 h. p.

CONSTRUCTION CAR FOR THE CARLISLE & MT. HOLLY RAILWAY CO.

FOR small railway systems the car shown has proved to be a useful part of the rolling stock as it is suitable for handling construction material and is also useful for the transportation of coal and cinders. In other words, it is a general utility car substantially built and well suited in every particular to the variety of purposes which it is intended to fulfill.

The hinged sides and ends are 12 in. high and $1\frac{3}{4}$ in. thick. Brill angle iron bumpers, radiating draw bars, gongs and sand boxes are used and the body is mounted on Brill 21-E truck with 7-ft. 6-in. wheel base, 33-in wheels arranged for 5-ft. $2\frac{1}{2}$ -in. track gage. The length of the body over the bumpers is 23 ft. 8 in. and the width over the sides is 6 ft. 6 in.



CONSTRUCTION CAR FOR THE CARLISLE & MT. HOLLY RAILWAY CO.—A General Utility Car—The Sides and Ends Are Hinged to Drop Down—Car Is Mounted on Brill No 21-E Truck

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BRILL MAGAZINE

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BRILL MAGAZINE

Published on the fifteenth
of each month by the

PUBLICITY DEPARTMENT OF THE J. G. BRILL COMPANY

In the interests of The J. G. Brill Company, American Car Company, John Stephenson Company, G. C. Kuhlman Car Company, Wason Manufacturing Company, Danville Car Company, Compagnie J. G. Brill.



BRILL MAGAZINE completes its fourth year with this issue. Commencing with a mailing list of twenty-three hundred names, over one thousand have been added each year and at present the circulation totals sixty-five hundred copies monthly. Forty-five hundred copies are distributed in the United States and Canada and two thousand are sent abroad. The circulation has been largely built up from requests to be placed on the list, and our salesmen and agents have at frequent intervals sent names, singly and in groups. Every name is alphabetically and geographically indexed and a systematic revision is carried on continually. Each year a letter is sent to every name on the list, a return-card being enclosed to confirm the address and to make sure of the magazine reaching the person addressed. Binders are furnished each year to those who re-

quest them—eight hundred were sent out the first of this year. In correspondence with customers BRILL MAGAZINE is continually used as a reference medium for types of equipment, dimensions and other data and it has proved in numerous ways to be the most direct, adequate and economical means which we can employ of keeping in touch with the entire field at home and abroad. By starting with a small circulation and allowing its growth in the main to depend on its merits; by keeping in touch with every name on the mailing list at regular intervals; by sending volume binders on request; by its use to customers as a reference medium; and by correspondence elicited from new sources, we are able to correctly estimate the value of the publication.



IT may interest our readers at home and in English-speaking countries to know how BRILL MAGAZINE is made acceptable to railway officials in countries where English is not understood. Commencing with the first issue of 1908, a four page folder containing a digest of each article and the complete inscription relating to each illustration, in either French or Spanish, has accompanied the copies sent to the countries where those languages are spoken or read.

WHEN one considers how serious a problem is that of traffic maintenance on city railway systems during and after heavy snow storms, it seems remarkable that manufacturers and technical writers have accorded the subject so comparatively little attention. That heavy snow storms are an infrequent occurrence even in the snow belt, may account in some measure for this. The modern sweeper is a well developed and efficient machine but it has its limitations and in deep snow and drifts must have the aid of heavier equipment. It must be admitted that the snow plow is somewhat primitive, *i.e.*, primitive in principle. With the exception of some unsuccessful experiments with various devices for melting the snow, progress has been merely along the lines of the basic ideas which postulated the "bucking" method of snow fighting as the only method, thus restricting development and to some extent precluding originality in inventive effort. There is no doubt that the deplorable traffic conditions attendant upon heavy snow falls could be greatly relieved, if not entirely prevented by the immediate and continuous employment of a sufficient number of sweepers or sweepers and plows, but as this would require so many, such provisions for an occasional condition is out of the question. Aside from the first cost, the railway company would be compelled to build extra barns for their accommodation. In the future perhaps, inventive genius will produce

a more adequate device than the snow plow, but for the present an increased equipment and the best possible distribution thereof is the only visible solution of the problem, and an imperfect solution at that.



IN the November issue of BRILL MAGAZINE we devoted some space to the subject of standardization of equipment and the generally beneficial results which might follow upon such a procedure. Though we spoke optimistically and hopefully, it was not without a full realization of the numerous difficulties in the way of the consummation of this apparently ideal and scientific condition. The designer and builder of rolling stock for electric railways faces greater problems than fall to the lot of technicians and mechanical engineers in most industries because of the great variety of types of equipment and the continually changing conditions. The electric railway industry is still young and it naturally follows that railway operators and the designers of rolling stock have not learned everything there is to be known. This mutual lack of knowledge, or imperfect comprehension, tends not only to retard development but to deflect it from the proper channel. The operator is apt to mistake conditions that are temporary for those that will be permanent and the designer and builder

faces the problem of satisfying individual demands and drawing from them correct conclusions as to those conditions which will eventually become general and permanent. This he must do in order to adhere to the proper highway of logical development. It is essential to all real progress that there be a perfect understanding of the fundamental principles involved. The changing conditions in the electric railway industry preclude to some extent this necessary understanding. In other words—the economic nature of the proposition has not been completely realized nor can be until the conditions that are general and permanent and their relation to the principles of construction and operation have been established.



IN the November issue of BRILL MAGAZINE we spoke of the higher standard of commercial ethics that is being generally adopted, and of the new era that has dawned upon the world of business. To follow the subject a little further—The keenness of competition and the ever increasing intensity of the struggle for existence and survival in the industrial world causes continual upheavals and readjustments of condi-

tions. The individual must be constantly producing something better, something a little above that of his predecessor or contemporary. To accomplish this, he must put more of himself into his field of endeavour for only by so doing can he hope to get more out of it. In earlier times when the commercial arena was less crowded and men were less enlightened and developed, the old conception of the term "business" was born. Business, in the then restricted sense of the term, meant shrewdness, hard, cold practicality and close calculation which often defeated its purpose. As time went on, business conditions were ameliorated but the original conception of the meaning of the term remained. The business man laid aside his higher intellectual, moral and social nature and, stripped of his most valuable and finest possessions, entered the mercantile field—a fraction of a man. Because this fraction was all business and nothing but business he imagined that he had reached the acme of commercialism. But the day has passed when a man may give to his work but a fraction of himself. The modern business man knows that he must give all of his many sided nature, all his versatility, all of himself; for his commercial, social, philosophical and imaginative nature combined is essential to effect the highest development of his creative and executive faculties.

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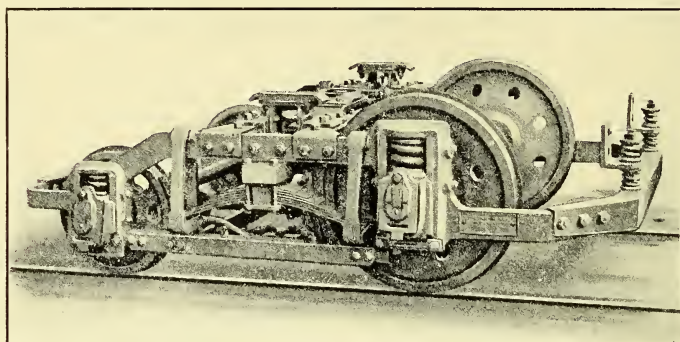
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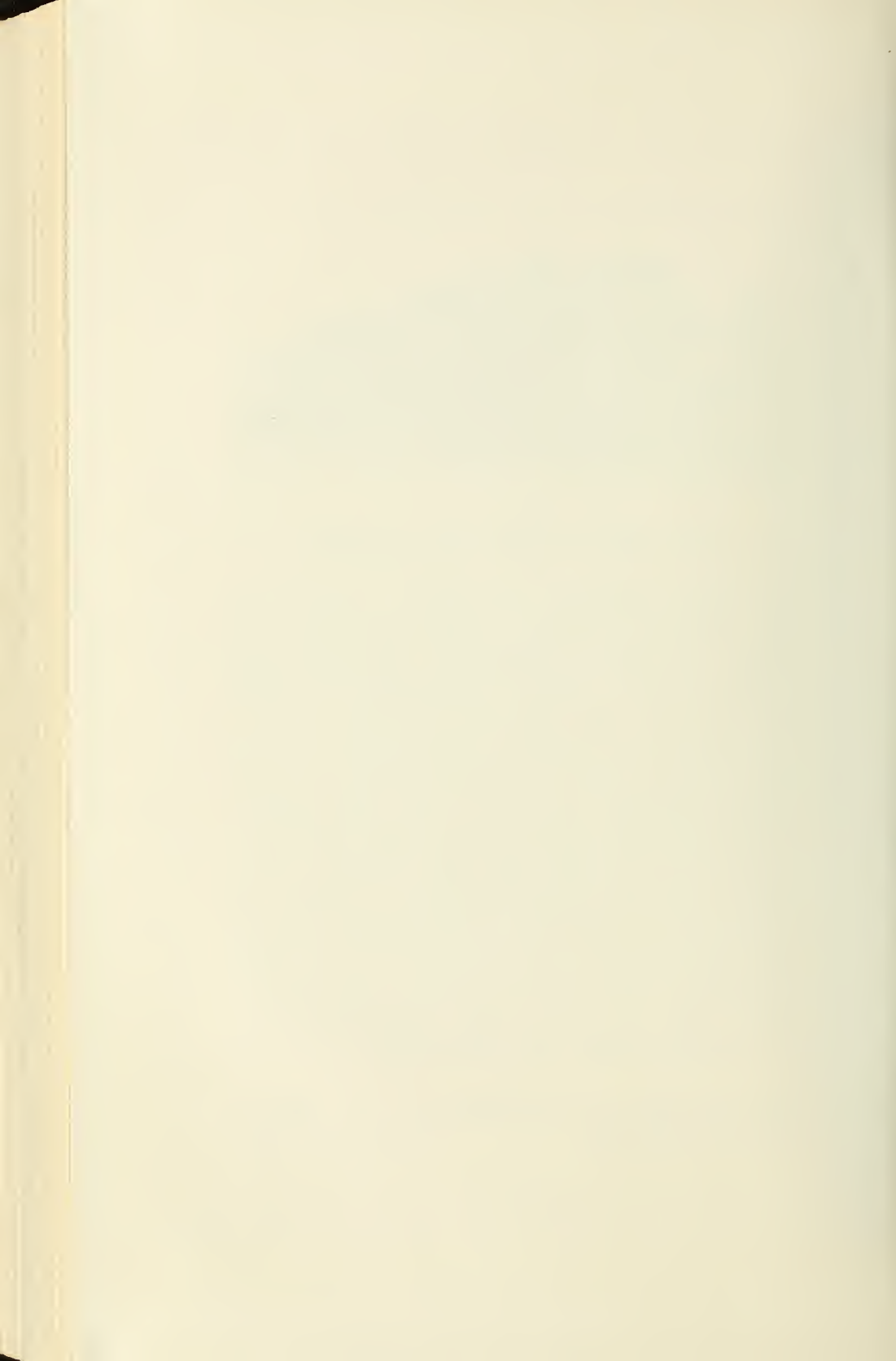
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BRILL No. 39-E TRUCK

Reduction in weight of equipment, saving in power and decrease in operating expense are the important advantages gained by using Brill 39-E Single Motor Truck. With the pony wheels toward the ends of the car, the trucks can be brought closer than other pivotal trucks, reducing the overhang and allowing a lighter weight underframe. Then for the step heights—with 30 inch driving wheels the steps may be $14\frac{3}{4}$ inches from the rail; from step to platform, 12 inches, and from platform to car floor, $8\frac{1}{4}$ inches. A simply devised differential brake system proportions the pressure of the shoes on both pairs of wheels and prevents skidding. From start to finish the truck is an economical proposition—its cost, construction, operation and maintenance must sooner or later come in for a careful study and critical comparison.

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